DEPARTMENT OF THE ARMY
NORTH ATLANTIC DIVISION, CORP OF ENGINEERS
FORT HAMILTON MILITARY COMMUNITY
402 GENERAL LEE AVENUE
BROOKLYN, NY 11252-6700

IN REPLY REFER TO

February 4, 2014

CECC-NAD

FEDEX 2 DAY

Sharon Kivowitz, Esq.
Assistant Regional Counsel
Office of Regional Counsel
U.S. Environmental Protection Agency
Region 2
290 Broadway
New York, New York 10007-1866

Re: Notice of Potential Liability and Request for Information Pursuant to the Comprehensive Environmental Response, Compensation, and Liability Act, 42 USC sections 9607(a) and 9604(e), Related to the New Cassel/Hicksville Ground Water Contamination Superfund Site in the Towns of Hempstead, North Hempstead, and Oyster Bay in Nassau County, New York

Dear Ms Kivowitz::

I am writing in response to the June 31, 2013 letter from Ms. Nicoletta Di Forte concerning the above referenced request.

We have processed your request and performed a search of the Corps' records. "Attachment 1" contains responses to EPA's request for information based on that search. I am also enclosing a DVD that contains documents supporting our answers to EPA's questions. We did not search the federal archives, since that site contains publicly available information that EPA can access at any time.

I am only submitting responses to questions #3.c. through #18. I understand that Department of Energy (DoE) will submit answers to questions #1 through #3 and question #18. Ms. Beverly Kolenberg of your office agreed to this breakout of the responses last September.

Please contact me at 347-370-4524 if you have any additional questions.

New Cassel/Hicksville Ground Water Contamination Superfund Site
In Towns of Hempstead, North Hempstead and Oyster Bay, NC, New York
104e Response
USACE Response, 4 February 2014

1 To be answered by DoE.

2 To be answered by DoE.

3 To be answered by DoE.

=contract information responsive to question 3.c. that USACE used as basis for its responses:

The dates (month and year) that each such contract began and ended;

December 10, 1951-Jan 29, 1966 (AT(30-1)-1293).
1961-1962 contract C-225
Unknown dates:
C-223
AT(30-1)-366gen
AP-1100
AT(30-1)-2370
AO-1050 (sic)

References: AEC, 1961

4 Provide copies of all maps, building plans, floor plans, and/or drawings for each Property identified in response to question 2 above. Your response to this question should include, but not be limited to, providing existing and former plumbing, drainage system plans, waste-water discharge areas, tunnel sumps, dry wells, septic systems, and waste lagoons in proximity to or within all structures on each Property.

The USACE Master Site Plan, which is Figure 2 in the Preliminary Assessment, was compiled from readily available site data. Other pertinent figures are included in the USACE RI.
Reference: USACE 2005, USACE 2010

5 For each Property identified in question 2, above, describe in detail the manufacturing processes and or other operations conducted at each Property on behalf of the Department of Energy or any predecessor, and the years of operations. If those operations changed through the years, describe the nature of all changes, and state the year of each change. If detailed information about the Department or Energy operations is not available, provide, at a minimum, a general description of the nature the operations at each Property performed by contractors for or on behalf of the Department of Energy or any predecessor, the years of operation, the type of work conducted, and the estimated number or employees for the operations.

Substance	Yes or No
Trichloroethylene (TCE)	Yes
Tetrachloroethylene (PCE)	Yes
Cis-1,2-dichloroethylene	No
1,1-dichloroethylene	No
1,1,1-trichloroethane (1,1,1-TCA)	No
1,4 Dioxane	No
Carbon Tetrachloride	No
Chlorobenzene	No
Benzene	No
1,2 –dichlorobenzene	No
Methyl ethyl ketone (2-butanone)	No
Sis (2 ethyl hexyl) phthalate and Butyl phthalate	No
Chromium	No
Trivalent Chromium	No
Hexavalent Chromium	No
Vinyl Chloride	No
Arsenic	No
Barium	No
Cadmium	No
Chloride	No
Copper	No
Ferrous Iron and Total Iron	No

Sylvania letter to AEC at least 6,000 kg of enriched uranium were handled.

Documentation suggests use of depleted uranium onsite was significantly less than that of other forms of uranium and was handled during the site operating period. Volumes cannot be estimated but licensed documents indicate about 8,000 kilograms were handled.

Documentation suggests natural thorium use onsite was significantly less than that of uranium and thorium was first requested in Oct 1954. The 1293 contract was amended to include natural thorium use in 1961. Volumes cannot be estimated but licensed documents indicate about 10,000 kilograms were handled.

Documentation in USACE possession does not indicate volumes of other industrial wastes such as PCE/TCE, aluminum, and nickel used, stored, or handled. USACE cannot estimate volumes of these chemical industrial wastes.

USACE has estimated, from documentation available from GTEOSI, that GTEOSI generated approximately 65,000 cubic yards of material during their investigation and remediation effort from 1999-2004. USACE is not aware of the details of activities by GTEOSI after 2004.

Investigation Derived Waste (IDW) soil and water have been generated from 2007-present by USACE RI/FS field work investigations. See response to #10 for disposal details.

8 Describe the activity or activities in which each industrial waste identified in your response to questions 6 above, was used, stored, generated, and or handled or received
Inspection report from 27 February 1959 stated that degreasing 'is done in an electrically heated perchlorethylene vapor degreaser. Due to its manufacturing association with PCE, TCE is also found as a site contaminant. USACE has not been able to locate, however, documentation to support the statement that TCE was used separately onsite.
Reference: Baliff 1959

Uranium natural-Uranium natural was used for feed slugs for the Hanford reactor and plutonium production, and also for various fuel assembly components. See section 1.2.3.1 of the RI for additional information.
Reference: Kingston 1954

Uranium depleted-Was not used for work related to AEC contract work that USACE could determine-Uranium depleted was used under licensed/commercial work, primarily for the construction of and/or research related to nuclear elements.
Reference: AEC, 1961

Uranium enriched-Was not used for work related to AEC contract work on the 100 and 140 building properties that USACE could determine-Uranium

USACE does not know how water or soils impacted by chemicals only (from the GTEOSI work) was disposed.
USACE IDW has been generated since 2007 and is summarized below:

USACE Phase I did not generate any IDW.

USACE Phase II generated IDW, primarily soil but included some pipes, a crushed drum, concrete cores, gloves, and plastic sheeting. All material was disposed of in drums to US Ecology Idaho. Profiles and manifests are attached and a summary is below.

Date	Facility	Material	Quantity
15 Dec 2008	US Ecology Idaho (USEI)	Primarily soil, non-haz	133 55-gallon drums
15 Dec 2008	USEI	Crushed lead lined drum, some soil, shipped as hazardous	1 55-gallon drum

Phase II also generated some potentially enriched material that was disposed of separately. The manifest is attached and the event is summarized below.

Date	Facility	Material	Quantity
23 Aug 2013	USEI	Non-hazardous soil-Special Nuclear Material	16 55-gallon drums

Phase IIIa generated IDW, water. The team used three 20,000 gallon frac tanks to containerize the water. Also generated were 20 drums (1,005 gallons) of water when sludge water and solids were separated. The manifest for this disposal is attached and a summary is below.

Date	Facility	Material	Quantity
25-26 Aug 2009	Clean Water of NY	Drill and GW purge water	47,163 gallons
09 Sep 2009	Clean Water of NY	Separated sludge water	1,005 gallons

Phase IIIb generated water and soil IDW. Manifests are attached and a summary is below.

Date	Facility	Material	Quantity
11-22-10	USEI	26 ppe/debris, 15 concrete, 30 empty-non hazardous waste	71 55-gallon drums
11-24-10	USEI	Non hazardous waste (soil)	1 roll off
11-24-10	USEI	Non hazardous	1 roll off

	NY	waste (water)	gallon
9-19-12	Clean Water of NY	Non hazardous waste (water)	1 frac tank-2515 gallon
9-19-12	Clean Water of NY	Non hazardous waste (water)	1 frac tank-5989 gallon
9-18-12	Clean Water of NY	Non hazardous waste (water)	1 frac tank-5626 gallon
12-20-11	Clean Water of NY	Non hazardous waste (water)	1 frac tank-5466 gallon
5-16-12	Pure Soil Technologies	Non hazardous waste (soil)	1 roll off
5-17-12	Pure Soil Technologies	Non hazardous waste (soil)	1 roll off
5-23-12	Pure Soil Technologies	Non hazardous waste (soil)	1 roll off
5-24-12	Pure Soil Technologies	Non hazardous waste (soil)	1 roll off
9-20-12	Pure Soil Technologies	Non hazardous waste (soil)	1 roll off
9-26-12	Pure Soil Technologies	Non hazardous waste (soil)	1 roll off
9-20-12	Pure Soil Technologies	Non hazardous waste (soil)	1 roll off
12-21-12	Pure Soil Technologies	Non hazardous waste (soil)	1 roll off

11 Describe where drummed wastes and or contaminated soils were staged on the property. If drums and or contaminated soils were buried on the Property, identify where they were buried. If buried drums and or contaminated soils were excavated and removed, identify the locations of the drum or soil removal. Provide an inventory of the number of drums, the contents of the drums, the volume and composition of the soils and the disposal site for such drums and soils. For drums disposed of off the Property, provide manifests for their disposal, if available.

USACE materials identified in question 6, all IDW, have been staged in the back 2 warehouse portions of the 70 building on the property. Our research indicates that GTEOSI staged their materials during their investigations and remediation in the 100 building.
In 1987, thirty buried drums and some contaminated soils were discovered on the current 70 property during construction by that property owner. In total, 57 drums and 90 cubic yards of soils were removed. The source of those drums is unknown. See USACE RI page 1-11 for details.
Reference: USACE 2010

12 State the number and the locations of the underground storage tanks (UST) at each property from the 1950s to present. For each UST, state

USACE has found that GTEOSI's predecessors discharged process wastes from the site to on-site sumps and leaching pools, which was a commonly accepted waste disposal practice of the era. The example process associated with the non-licensed work at the site includes information that liquid effluents flowed into a sump pond and former sump.
Reference: USACE 2005

15 Identify all leaks, spills, or releases of any kind of any industrial wastes (including, but not limited to TCE and PCE or other chlorinated or non-chlorinated solvents or wastes containing such solvents) into the environment that have occurred, or may have occurred, at or from each Property, including any leaks or releases from drums and other containers. Provide copies of all documents relevant to your response.

USACE has not identified any leaks or spills. The release of liquid effluents is discussed above in #14.

16 Explain whether any repairs or construction were implemented to address any leaks, spills, releases or threats of releases of any kind, the nature of the work and the dates of any such work,

As per the answer to #15 above, USACE has not identified any leaks, spills, releases, or threat of releases that had a repair or construction related to them.

17 State the names, telephone numbers, and present or last known addresses of all individuals whom you have reason to believe may have knowledge, information, or documents regarding the use storage, generation, disposal or industrial wastes at the site, the transportation of such materials to the Site, or the identity of any companies whose material was treated or disposed of at the Site.

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References:

a. USACE 2005. US Army Corps of Engineers, Sylvania Corning Plant/Former Sylvania Electric Products Facility (A.K.A. SYLCOR) Site Preliminary Assessment. May 2005.

b. USACE 2010. US Army Corps of Engineers, Final Remedial Investigation for the Sylvania Corning FUSRAP Site. September 2010.

c. AEC, 1961. Excerpt May 1961 Inspection Report. Details of March 13-14, 1961 Part 70 Inspection (conducted by John R Sears and Paul B Klevin of the New York Operations Office) of the Activities Related to Use of Special Nuclear Material. May 1961.

d. Baliff 1959. Jack Baliff and Irving Kingsley, New York City Division of Industrial Hygiene. Inspection of Sylvania Corning Nuclear Corp Cantiague Road, Hicksville, NY. June 11, 1959.

e. Kingston 1954. W.E. Kingston, Sylvania Electric Products. Amendment No 1 to Appendix B Dated December 7, 1953 to Contract No AT.30.1.1293 Dated December 10, 1951. January 13, 1954.

U.S. ARMY CORPS OF ENGINEERS

SYLVANIA CORNING PLANT/FORMER SYLVANIA ELECTRIC PRODUCTS FACILITY (A.K.A. SYLCOR) SITE

in Hicksville

Town of Oyster Bay

Nassau County

New York

PRELIMINARY ASSESSMENT
FINAL

May 2005

Prepared by: U.S. Army Engineer District, New York
U.S. Army Engineer District, Kansas City

Table of Contents

EXECUTIVE SUMMARY

1. The United States Army Corps of Engineers (USACE) conducted a Preliminary Assessment (PA) of the Sylvania Corning Plant/Former Sylvania Electric Products Facility (A.K.A. Sylcor) site (the Site) in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) [42 U.S.C. 9601 et seq., as amended] and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) [40 CFR 300].

2. The purpose of this PA is to review readily available information to determine the need for further action by USACE, to ensure protection of human health and the environment.

3. The Site is a 10.5 acres area divided into three (3) separate but contiguous properties located at 70, 100 and 140 Cantiague Rock Road, Town of Oyster Bay, County of Nassau, State of New York, in the westernmost portion of Hicksville, Long Island, approximately thirty (30) miles east of lower Manhattan. The Site was operated from 1952 to 1967 for the research, development, and fabrication of nuclear elements (e.g., fuel elements, slugs) under Atomic Energy Commission (AEC), other Government, and commercial contracts. High temperature coatings, ceramics, and composite alloys for the space and aircraft industries were also fabricated on-site. The Site remained privately owned throughout its history.

4. The USACE has reviewed existing, readily available data on the Site. Based on that review, there is evidence of a release and/or threat of release into the environment of hazardous substances (specifically radioactive materials) resulting from work performed as part of the Nation’s early atomic energy program that is not a federally permitted release. However, considerable licensed work took place on the Site involving radioactive materials similar to those used in non-licensed work under the 1293 and other AEC contracts. Although there is a reasonable likelihood that some of the contamination on the Site resulted from non-licensed work, geographic segregation of non-licensed and licensed activities was not sufficient to state definitely

the portions attributable to each. A more detailed analysis such as that in a CERCLA Remedial Investigation is recommended to determine which areas of the Site should be designated for FUSRAP cleanup.

While insufficient data currently exist to adequately define the extent of the risks, the possibility exists that further migration of contaminants related to the Nation’s early atomic energy program could occur. This migration may occur due to groundwater movement and/or the completion of groundwater, soil, or air exposure pathways, and may present a hazard to human health and the environment in the future.

There is also evidence of a release and/or threat of release into the environment of hazardous substances (chemicals) resulting from work performed at the Site. However, it cannot be determined at this time, based on available evidence, whether this release is attributable to the Nation’s early atomic energy program.

In accordance with FUSRAP and CERCLA, since there is an unpermitted release and/or threat of release of hazardous substance resulting from work performed as part of the Nation’s early atomic energy program, a FUSRAP response is appropriate and is recommended if other relevant criteria in ER 200-1-4 are met. Since significant data gaps exist regarding contamination extent in both soil and groundwater, additional investigation is recommended.

1.0 INTRODUCTION

The United States Army Corps of Engineers (USACE) conducted a Preliminary Assessment (PA) of the Sylvania Corning Plant/Former Sylvania Electric Products Facility (A.K.A. Sylcor) site (the Site) in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) [42 U.S.C. 9601 et seq., as amended] and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) [40 CFR 300]. Also used as a reference for this PA was the Environmental Protection Agency (EPA)"Guidance for Performing Preliminary Assessments Under CERCLA" (EPA, 1991). The purpose of this PA is to review information to determine the need for further action by USACE, to ensure protection of human health and the environment.

In 1974, the Department of Energy (DOE) created the Formerly Utilized Sites Remedial Action Program (FUSRAP) to address sites used during the early atomic energy program that had residual contamination exceeding current regulatory limits. In the Energy and Water Development Appropriations Act, 1998 [Public Law 105-62, 111 Stat. 1320, 1326], Congress transferred responsibility for administration and execution of cleanup at eligible FUSRAP sites to USACE. In the Energy and Water Development Appropriations Act, 2000 [Public Law 106-60, 113 Stat. 483, 502], Congress mandated that FUSRAP response actions undertaken by the Secretary of the Army, acting through the Chief of Engineers, be subject to CERCLA and the NCP.

In March of 1999, USACE and DOE signed a Memorandum of Understanding (MOU) between the agencies for the purpose of delineating the responsibilities of each party relating to the administration and execution of the FUSRAP. Pursuant to that MOU, when a new site is considered for inclusion in the FUSRAP, DOE is responsible for performing historical research to determine if the site was used for activities that supported the Nation's early atomic energy program. If DOE concludes that the site was used for that purpose, the agency will provide USACE with a determination of eligibility for FUSRAP. USACE is then responsible for determining whether the eligible site should be designated for cleanup. To make that determination, USACE first prepares a PA in accordance with CERCLA and the NCP to determine if a response action is appropriate.

The purpose of a PA at eligible FUSRAP sites is to determine if there is an unpermitted release or threat of release, as those terms are defined in Section 101(22) of CERCLA, of a hazardous substance related to the Nation’s early atomic energy program at the site that may present a threat to the public health or the environment. If a PA determines that there is such a release or threat of release, that may present a threat to the public health or the environment, and the release resulted from work performed as part of the Nation’s early atomic energy program, a FUSRAP response action subject to CERCLA requirements is warranted. In such circumstances, the PA will recommend appropriate action to address the release or threat of release. If no such release or threat of release is found, the PA will recommend no further action.

The scope of USACE’s review during performance of the Sylcor PA included a site visit and a review of readily available Site information.

The Site, as it is referred to throughout the PA, was operated from 1952 to 1967 for the research, development, and fabrication of nuclear elements (e.g., fuel elements, slugs) under Atomic Energy Commission (AEC), other Government, and commercial contracts (USACE, 2004). High temperature coatings, ceramics, and composite alloys for the space and aircraft industries were also fabricated on-site (GTEOSI, 2003c). At all times throughout its history, the Site remained privately owned.

Previous investigations by the New York State Department of Environmental Conservation (NYSDEC) and the current property owner have identified uranium, thorium, nickel, chlorinated solvents, and to a lesser degree, volatiles (toluene, xylene, acetone, etc.) as Site contaminants. These contaminants, with the exception of volatiles, are also identified in the voluntary agreement between the NYSDEC and the current property owner. The Site is currently divided into three (3) separate but contiguous properties, each individually owned: the “70,” “100,” and “140” properties. GTE, a corporate predecessor to the Verizon entities (Verizon, Inc. and Verizon Communications, Inc.), current owner of the 140 and 70 properties, and lessee of the 100 property, entered into a voluntary cleanup agreement with the NYSDEC to remediate the soils at the Site to allow unrestricted future use of the Site. The voluntary cleanup included investigations (soil and groundwater) as well as remediation of soils at the Site. Relatively readily accessible, meaning not under buildings or below the water table, contaminated soils have been excavated and disposed off-site from cells 1-14 as shown on Figure 2. See Figure 7 for predicted excavation areas and estimated depths for the voluntary remediation.[1] Documentation provided in Attainment and Verification Reports from Verizon states that contaminated material remains in discrete locations within some of these cells. It was also observed during the voluntary remediation that contamination appears to extend beyond some of the cell walls in cells 9, 10, and 12 to areas under the 100 property building (Rushton, 2003). The USACE is not involved in this voluntary agreement. The Site is within NYSDEC’s Region 1 boundaries, and is listed by NYSDEC as Site No. V00089-1.

[1] Figures 4-7 were prepared prior to the voluntary remedial activities that were performed at the Site by the property owner and were based upon tests conducted prior to excavation. Voluntary remedial activities have occurred since Figures 4-7 were prepared and the actual voluntary remediation effort may have differed from what was predicted.

2.0 SITE LOCATION, CLIMATIC CONDITIONS, DESCRIPTION, OPERATIONAL HISTORY AND WASTE CHARACTERISTICS

2.1 Location

The Site is a 10.5 acres area divided into three (3) separate but contiguous properties located at 70, 100 and 140 Cantiague Rock Road, Town of Oyster Bay, County of Nassau, State of New York, in the westernmost portion of Hicksville, Long Island, approximately thirty (30) miles east of lower Manhattan. See Figure 1. The three (3) contiguous parcels are also known as Tax Map Section 11, Block 499, Lots 94, 99, and 100 (from south to north). Industrial and commercial properties are located directly north, south and west of the Site. Specifically, the Site is bordered on the north by the Nassau County Department of Public Works (NCDPW), on the south by General Instruments' (GI's) inactive hazardous waste disposal site, on the west by Cantiague Rock Road, and on the east by the golf driving range of Cantiague Park.

Generally, the Site is located in an industrial area of Hicksville. Across Cantiague Rock Road from the Site are a vocational technical school and other light industrial or commercial activities. The nearest residential area is northeast of the site, approximately one (1) block north. Regionally, the Site is located on a glacial outwash plain. Few surface water bodies are found near the Site.

2.2 Local Climatic Conditions

Long Island has a humid climate that is controlled primarily by the prevailing westerly winds, causing most weather systems to approach from the continental United States. Temperature extremes tend to be subdued by the proximity of the Atlantic Ocean (Isbister, 1966). Precipitation recharges Long Island's groundwater resource, or is lost through either direct runoff or evapotranspiration (Peterson, 1988). Annual precipitation averages about 43.87 inches. Average daily temperatures range from a low of 39.8°F in February to a high of 75°F in July. Average temperature and precipitation data for the area are collected at the National Climatic Data Center Mineola Cooperative.

2.3 Site Description

The Site consists of the 70, 100, and 140 Cantiague Rock Road properties. Individual buildings sit on each property, with the remaining lot areas either paved or covered with fill material. Contaminated material was excavated from some of the remaining lot areas and they were either paved or covered with fill material as a result of the recent voluntary remediation activities. The 140 property (4.0 acres) is occupied for the purpose of performing the voluntary remedial action; the 100 property (2.5 acres) is used as storage in support of the remedial action; and the 70 property (3.9 acres) is occupied by Air Techniques (a dental equipment manufacturing company). See Figure 2.

2.4 Operational History and Waste Characteristics

The privately owned Site was utilized for the manufacture of Government and commercial nuclear elements (e.g., cores, slugs, fuel elements) for reactors used in research and electric power generation between 1952 and 1967. There were two (2) separate reactor element-manufacturing processes at the Site. Contamination on the Site is mainly a result of commonly accepted waste disposal practices of the era in which operations occurred. Contaminated liquids were discharged to leach pools and sumps (Kingsley, 1959).

Also, scrap materials were burned in Building 8 and handling of this residue potentially contaminated Site soils (Davis, 1955).

2.4.1 Non-Licensed Work

Non-licensed work at the Site primarily occurred on the parcels of land at 100 and 140 Cantiague Rock Road. These two parcels comprise lots 99 and 100 (formerly single lot 80) and were referred to as Parcel N. Non-licensed government work was conducted under AEC Contract No. AT (30-1)-1293 (the “1293 contract”) in historical (i.e., now demolished) Buildings 1, 2, 3, 5, 6, 7, 8, 9, and 16. See Figure 2. Non-licensed work at the Site produced nuclear elements under the 1293 and other smaller contracts with the AEC using primarily non-worked uranium natural metal (i.e. derby)(Kingsley, 1959). Note that the contracts referred to as "other smaller contracts" may have been large contracts but the portion done at Hicksville was small. Uranium natural and thorium natural were used in the construction of and/or research related to these elements.

A typical process for the non-licensed work is summarized as follows:

1. Cast ingot or derby was cleaned by acid pickling and dried.
2. The cleaned ingot or derby was hydrided to UH3 under hydrogen at 450 degrees Fahrenheit.
3. The hydride powder was decomposed at 900 degrees Fahrenheit to uranium metal powder under vacuum or inert gas.
4. The metal powder was blended and cold pressed into compacts.
5. The compacts were hot pressed at 630 degrees Celsius under vacuum to a solid uranium slug of specification density.
6. The pressed slugs were cooled, then cleaned by acid pickling or surface grinding.
7. The ground slug was contour ground, and the end radii were machined.
8. The cleaned slugs were inspected and packed for shipment.

Available 1293 contract papers state that 2.6 million kilograms of uranium metal were handled for the 1293 contract operations. Documentation available from DOE reports indicates this number potentially could be as high as 6 million kilograms.

Later slug canning processes included nickel and aluminum plating (DOE, 1962). A procedure was evolved to solvent clean and acid clean bare metal before plating (Huber, 1955).

Sylvania's liquid effluents, except for sanitary sewers, flowed into a sump pond immediately behind Building 4. Samples of sump water were taken and the analytical results reported to management (SEP, 1963). Note on Figure 2 that sumps 1 and 2 are immediately adjacent to sump 4 and behind

Building 4. During operations for production as described above, the AEC authorized Sylvania to perform a study and develop a means for reducing nickel and uranium content in AEC fuel wastewaters. Results indicated that there could be no guarantee that any method would reduce nickel content below 0.05 mg/kg (Gieb, 1959).

In 1953, the AEC gave Sylvania Electric Products, Inc. (SEP) permission to use a portion of historical Building 2 on the 140 property for other than 1293 contract work (AEC, 1953). In 1965, when AEC element manufacturing ended, the AEC plant (the 1293 contract area) was decontaminated and released for other work by Isotopes, Inc., a contractor for the AEC, in conformity with the State of New York Industrial Code Rule number 38-29 (Giboney, 1973). Decontamination and final surveys were completed in December 1965. Decontamination addressed buildings and land areas. Limited soil excavation to a depth of four (4) inches was conducted in sump 3, sump 2 and the drum storage area between Buildings 6 and 7. Removed soil, concrete, and macadam were drummed and sent for off-site disposal (three hundred (300) tons in all).

In February 1966, the New York State Department of Labor (NYSDOL) informed SEP that the 1293 area was fit for use as other than a radiation installation. It is important to note that any sump still in use by SEP's licensed operations, including sump 1, was excluded from this clearance (Giboney, 1973). In May 1966, the AEC declared Buildings 1 and 2, and the surrounding grounds, fit for unconditional release (Giboney, 1973).

The NYSDOL conducted a survey of its own in January 1967 on Building 4, and areas of Building 2. This survey declared Building 4 fit for non-radioactive use, but it excluded sump 1 and three (3) rooms in Building 2 from this release until further analytical results were confirmed (Kleinfeld, 1967a). The sump and three (3) rooms in Building 2 were released shortly thereafter (Kleinfeld, 1967b). The historical Sylvania buildings on the 100 and 140 Cantiague Rock Road properties were demolished in 1967 (Unknown, 1996).

After completion of the soils decontamination efforts at the non-licensed operations area, five (5) samples were analyzed for uranium-238. Results ranged from 15-136 pCi/g with three (3) of the five (5) being greater than the current voluntary cleanup criteria. The mean value for U-238 residuals was 66 pCi/g. The AEC decontamination report identified difficulty in the decontamination of sump 3 due to the soft texture of the soil and the depth of the sump. A crane with bucket was utilized to remove top four (4) inches of material from the sump. However, personnel could not enter the sump (Bradley, 1966).

During the remediation efforts of the voluntary cleanup at the 100 property cell 11, three (3) underground storage tanks (UST) were discovered. The tanks were reportedly not used by GTE or during its predecessors' former operations. GTE also reported no visible indications of any release from any of the three (3) tanks. After removal of the USTs, gamma scans indicated no residual radiological contamination above background levels present on the tanks. No analytical results above Site cleanup levels were available (GTEOSI, 2003d).

Later remediation activities on the 140 property in cell 2 of the voluntary cleanup unearthed a single tank of unknown age and use. The tank contained approximately 875 gallons of liquid and sludge. The sludge sample detected pH=12.6, 450 mg/kg of 1,1-dichloroethance, 11,000 mg/kg of total tetrachloroethene, 35 mg/L of TCLP tetrachloroethene, 1,690 ug/L of TCLP copper, 23,5000 pCi/g of uranium 234, 1,290 pCi/g of uranium 235, and 24,5000 pCi/g of uranium 238 as the primary detections. The liquid sample detected: pH=13.3, 35 mg/L of 1,1-dichloroethane, 38 mg/L of total tetrachloroethene, 5.1 mg/L of TCLP tetrachloroethene, 764 ug/L of TCLP copper, 231,000 pCi/L of uranium 234, 13,000 pCi/L of uranium 235, and 235,000 pCi/L of uranium 238 as the primary detections. After that tank was removed, the impacted soils beneath the tank were removed. The closure samples collected from the bottom of cell 2 after the soil excavation were within the cleanup objectives (Stewart, 2005b).

One (1) UST was discovered in cell 10 during the voluntary cleanup activities. This tank contained 400 gallons of liquid. “The concentration of U-238 in the liquid [was] 18,600 pCi/g [*sic*]. . . [,] U-235 [was] 910 pCi/g [*sic*]. . . . . The concentration of Th-232 in the liquid [was] 144 pCi/g [*sic*].” Results for chemical analysis were below the Site cleanup criteria set forth in the voluntary cleanup agreement. All tanks were shipped off site for disposal (URS, 2004b).

Also as part of these voluntary cleanup activities, drums and drum pieces were discovered in several remediation cells. These cells included 3, 4, 7, 9, 10, and 11 (Stewart, 2005b). Analytical results from two (2) drums in cell 3 were as follows: 1,640 pCi/g U-238, 1.15 pCi/g Th-232, 559 mg/kg PCE, and 38 mg/kg TCE (Hays, 2004).”

2.4.2 Licensed Work at the Site

Operations not under the 1293 AEC contract at the Site occurred primarily on the 70 Cantiague Rock Road parcel and produced many different kinds of fuel elements for different reactors. Natural, enriched, and depleted uranium were handled. With the sale of the Sylvania entities’ Nuclear Division assets, production of fuel elements and components ceased on June 10, 1966 (Rusinko, 1996).

The major steps of the commercial operations changed very little over the period of operations, but some modifications were made based on desired product. Examples of commercial work consist of the following:

1. Material was received, identified by a process number, and brought to the incoming vault storage area.
2. Accountability personnel entered the vault to remove raw material in order to made up charges. The charges were made up in the accountability room.
3. The material was then taken to the melt furnace area and placed in a vacuum induction furnace.

Criticality limits for this area were 2 kgs of U-235 per melt. Melting of enriched uranium-molybdenum and enriched uranium-aluminum in graphite and ceramic crucibles in vacuum melting furnace occurred.

4. Vacuum heat treating of uranium-molybdenum and depleted uranium in heat-treating furnaces occurred.
5. Sintering of uranium oxide-powdered stainless steel in hydrogen atmosphere sintering furnaces occurred.
6. Annealing of uranium oxide-stainless steel fuel plates and aluminum fuel plates in hydrogen atmosphere sintering furnace occurred.
7. Brazing of stainless steel and aluminum fuel elements in hydrogen atmosphere brazing furnaces occurred.
8. After the material is made into an ingot, it was taken to a heating furnace, heated, and then rolled to the proper dimensions. Rolling of uranium-stainless steel billets in hydrogen atmosphere rolling furnaces and rolling mills and uranium-aluminum fuel plates in air heating furnaces and hot and cold rolling mills occurred.
9. Swaging of clad and unclad uranium rods and pins occurred.
10. Sodium loading of uranium rod-stainless steel tubing involving argon gas and special furnaces, sodium metal dispenser and vacuum pumps occurred.
11. Iso-static pressing of uranium pellets-aluminum tubing involving argon gas in iso-static pressure vessel and compressor occurred.
12. Vacuum desiccators of uranium oxide-stainless steel powder compacts using vacuum and chemical desiccators and vacuum pumps occurred.
13. Chemical cleaning of all products involving hot and cold acid, caustic solvents solutions and vapors, water and demineralized water and anodizing and anodizing solutions using cleaning tanks, hoods, exhaust blowers, and vapor degreaser occurred. Inspection report from 27 February 1959 stated that degreasing “is done in an electrically heated perchlorethylene vapor degreaser. (Kingsley, 1959).
14. Compacting of uranium oxide-powdered stainless steel in hydraulic presses and dies occurred.
15. Pinch cores were made, and the piece was greased and taken to process storage. In the process

storage facility, the cores, the skull, the dross and scrap were placed on shelves, which were located on 18-inch centers.

16. The cores were then pressed into picture frames, taken to the heating furnace and rolled in a rolling mill. After rolling, the material was then brought back for in-plant storage.
17. Machining of uranium bearing alloys and non uranium-bearing fuel element plates, pins, assembled fuel elements and fuel element components using milling machines, lathes, and centerless grinders occurred.
18. Other operations that were then performed on the material consisted of cutting off and forming curvatures on the plates, acid cleaning, inspection, assembly of the elements, machining, and welding.
19. Finished elements were checked by Production control and further inspected both prior and after assembly.

Significant data gaps exist that do not allow for an accurate depiction of the amount of uranium metal handled for the licensed operations at Hicksville. Documentation regarding these operations has not been located to date. It also is not possible to determine the upper bound of materials handled because the available licenses did not always have limits specified.

Plant B water containing less than 0.5 gram uranium per liter was released. Sample results indicated that the highest concentration released to the inspection date was 0.025 gram per liter (Klevin, 1958).

Atcor, Inc began a survey and decontamination effort on Building 4 in November 1966. This survey effort concentrated on the building interior only (Swiger, 1967). The NYDOL conducted a survey of its own in January 1967 on Building 4, and areas of Building 2. This survey declared Building 4 fit for non-radioactive use, but it excluded sump 1 and three (3) rooms in Building 2 from this release until further analytical results were confirmed (Kleinfeld, 1967a). The sump and three (3) rooms in Building 2 were released shortly thereafter (Kleinfeld, 1967b). The AEC removed the Hicksville Site as a place of use on license SNM-82 in April 1967, based on this survey (Nussbaumer, 1967). The State of New York released the Site for non-radiological use based on AEC surveys, an Atcor survey, and its own investigation on September 19, 1967 and canceled the New York State Radioactive Materials License #325-0083 (Kleinfeld, 1967).

In 1967, when licensed element manufacturing ended, the licensed operations area was decontaminated, and free-released by NYSDOL. Later, in 1987, after the acquisition of Lot 103 (the eastern part of the 70 Cantiague Rock Road property) from Nassau County, buried drums and some contaminated soils were discovered on the current 70 Cantiague Rock Road property during construction of an addition to the former Sylvania Building 4 (Unknown, 1996). Drums were in various conditions, but samples from remaining materials indicated PCE, polychlorinated biphenyls (PCBs), arsenic, and TCE (ERM-Northeast, 1993).

Some of the elements produced by both the licensed and non-licensed work were coated with nickel to improve corrosion resistance and decrease oxidation and diffusion of uranium metal. Process wastes, which included PCE, a common industrial solvent used to degrease manufactured parts, were discharged to on-site sumps and leaching pools (Kingsley, 1959). See Figure 2.

3.0 PHYSICAL CONDITIONS

The Site is highly developed and is virtually void of vegetation due to this industrial development. Ornamental landscaping and weeds are the only vegetation on the Site. The regional geologic setting consists of unconsolidated geologic deposits overlying bedrock. The deposits are approximately 1,100 feet thick near the Site, thinner in the northwestern part of Nassau County and thicker southward. The deposits are divided into seven (7) surficial geologic units: two members of the Raritan Formation, the Magothy Formation, two distinct units of the Port Washington Deposit, the Port Washington Clay Unit, and the Upper Pleistocene Deposits (Isbister, 1966; Smolensky and Feldman, 1988).

Overburden beneath the Site consists of unconsolidated deposits. These deposits consist of residual or weathered bedrock, sand, silt, clay, and gravel of alluvial or glacial origin. Based on relatively recent Site boring logs, surficial deposits are fairly uniform, fine to coarse sands with little gravel. These deposits have been evaluated from the surface to two hundred twenty (220) feet below ground surface (bgs). Discrete lithological differences were not noted during field investigations. Depth to groundwater at the Site is 67-73 feet. Overburden (geologic deposit overlying bedrock) is approximately 1100 feet thick at this site (O’Brien & Gere Engineers, Inc., 2000).

The bedrock underlying Long Island is Precambrian to lower Paleozoic in age. The bedrock geology predominately consists of schist and gneiss with igneous intrusions. The bedrock is known to have some fractures. However, the fractures are not considered significant within the regional hydrogeology because of relatively low fracture permeability in comparison to the unconsolidated deposits.

Regionally, surface water in Nassau County consists of a few small streams, ponds, and marshes. Surface water collection is mainly controlled by precipitation rates, infiltration, runoff rates, and by perched water tables. Numerous perched ponds, marshes, and effluent streams occur north of the Ronkonkoma Moraine, which is north of the Site (Isbister, 1966).

Headwaters of the streams on Long Island tend to originate in the highlands of the Ronkonkoma and Harbor Hill Moraines. To the north, sediments tend to be impermeable tills that support perched water tables and receiving streams. To the south of the highlands, outwash plain deposits are usually very permeable and will not support a perched water table. Streams to the south of the Ronkonkoma Moraine tend to be losing and often disappear completely. Direct runoff from urban areas (pavement, rooftops) is re-routed by storm drainage systems to numerous recharge basins, which ultimately replenish the water table.

There are no sensitive environments as defined in 40 CFR 300, Appendix A, Table 4-23 present on the Site, or in the vicinity of the Site. Therefore, there is no potential for release to sensitive environments (Stewart, 2005a).

4.0 PATHWAYS

4.1 Soil and Air Pathways

Potentially contaminated material exists under Site buildings and in other subsurface areas. As stated previously in Section 1.0, GTE entered into a voluntary cleanup agreement with the NYSDEC to remediate the soils at the Site to allow unrestricted future use of the Site. To date, the voluntary remedial action addressed relatively readily accessible contaminated material (i.e., on-site material other than material under buildings). The building slabs and the backfill material placed in areas where the voluntary cleanup was conducted prevent direct contact with contaminated soils. Given this, the potential soil and air pathway receptors are minimal. Should construction activities such as removal of building slabs or excavations occur in the future, direct contact with contaminated material may be possible, thus completing the soils and air pathways.

Contaminant cleanup levels in soil (GTEOSI, 2003b) for the voluntary cleanup are as follows:

U-238	50 pCi/g
Th-232	2.8 pCi/g
PCE	1.82 mg/kg
TCE	0.7 mg/kg

Limited data exists on contaminant levels and depths under Site buildings, as well as potential exposures inside of buildings. The following characterization discussions include some data from under buildings and data that has since been addressed in the remediation, and are presented to identify potential contaminants of concern (COCs) and levels for areas not addressed by the voluntary remedial action to date. Use of these data to estimate COC levels remaining on-site is appropriate given that during the voluntary remediation, it was noted that some contaminated lenses of material extended beneath buildings. Additionally, not all contamination was removed from remediation areas due to various construction and engineering limitations.

Radiological Characterization

An August 20, 1996 Nuclear Regulatory Commission (NRC) inspection of the Site indicated two (2) soil samples with elevated U-238, and Th-232 levels. Maximum results were 2,613 and 46.6 pCi/g, respectively. The inspection report stated that the levels exceeded NRC criteria for unrestricted release. Results were confirmed by the NYSDEC (Bellamy, 1996a).

A December 2000 investigative report indicated Site contaminants were uranium and thorium in subsurface soils and groundwater. U-238 levels in soils as high as 1,190 pCi/g and Th-232 levels as high as 67 pCi/g were reported. (O'Brien & Gere Engineers, Inc., 2000).

During a March 2001 supplemental investigation, soil samples from borings on the three (3) properties exhibited above background concentrations for U-238 and Th-232. Maximum concentrations were 660 pCi/g and 57 pCi/g, respectively, on the 70 property. Maximum concentrations were 382 pCi/g and 69 pCi/g, respectively, on the 100 property. Maximum concentrations were 155 pCi/g and 5 pCi/g, respectively, on the 140 property. Borings in leach pool areas went to twenty (20) feet bgs. (GTEOSI, 2001).

Concentrations of uranium and thorium greater than the Site's voluntary agreement cleanup criteria were detected in some samples. Of three hundred six (306) samples taken in the fall of 2002, fifty-six (56) samples exceeded the U-238 voluntary cleanup criteria and twenty (20) samples exceeded the Th-232 voluntary cleanup criteria. The maximum U-238 result was 800 pCi/g (GTEOSI, 2003a).

Nine (9) of thirty-four (34) samples collected in a April 2003 additional borings investigation exceeded the voluntary cleanup criteria for U-238 and five (5) exceeded the Th-232 voluntary cleanup criteria. The maximum U-238 result was 459 pCi/g at eleven (11) feet bgs (GTEOSI, 2003b).

Background soil concentrations in the Hicksville area of U-238 and Th-232 range from non-detect to less than 1 pCi/g each (NYSDEC, 2003).

Cabrera Services surveyed the building on the 70 property in April 2003. Discrete elevated levels of radioactivity were identified in the building. A dose assessment was conducted to demonstrate that the levels were acceptable based on an industrial use scenario (Cabrera, 2003).

Site investigation data is summarized on Figure 5. NYSDEC reports that actual concentrations encountered during remediation were greater than those reported in investigation reports discussed above (Stewart, 2005b).

Chemical Characterization

The December 2000 investigative report indicated Site contaminants were PCE and trichloroethylene (TCE) in subsurface soils and groundwater. PCE concentrations as high as 18,000 mg/kg and TCE as high as 29 mg/kg were reported in soils. Above background metals (nickel) appear to be confined to depths greater than four (4) feet (O’Brien & Gere Engineers, Inc., 2000).

During the March 2001 supplemental investigation, soil samples from borings on the three (3) properties exhibited above background concentrations for PCE, TCE, and nickel. Maximum concentrations were 0.024 mg/kg, 0.001 mg/kg, and 3,980 mg/kg, respectively, on the 70 property. Maximum concentrations were 75 mg/kg, 3.4 mg/kg, and 20,100 mg/kg, respectively, on the 100 property. Maximum concentrations were 92 mg/kg, 0.17 mg/kg, and 384 mg/kg, respectively, on the 140 property. Borings in leach pool areas went to twenty (20) feet bgs (GTEOSI, 2001).

One hundred seventy-one (171) samples were analyzed for volatile organic compounds (VOCs) and Target Analyte List (TAL) metals during the fall 2002 soils investigation. Ten (10) samples contained PCE and three (3) samples contained TCE above Site voluntary cleanup criteria. PCE concentrations were as high as 540 mg/kg. No concentrations of nickel exceeded the voluntary cleanup criteria (maximum of 67 mg/kg). Low concentrations of toluene, xylene, acetone and other VOCs were detected (GTEOSI, 2003a).

Sampling during the fall 2002 effort concentrated on the eastern end of the 140 property, the southern and eastern sides of the 100 property, and the northern side of the 70 property. This sampling appeared to generally target former leach pools and sump areas.

Four (4) of the thirty-two (32) samples collected in the April 2003 additional borings investigation exceeded the voluntary cleanup criteria for PCE, and no samples exceeded the voluntary cleanup criteria for TCE. The maximum PCE concentration was 440 mg/kg. Two (2) samples were taken for disposal characterization purposes within previous elevated nickel areas. Total nickel concentrations ranged from 55 to 28,000 mg/kg and eleven (11) feet bgs (GTEOSI, 2003b). Site investigation data for VOCs, including TCE and PCE, as well as metals is included in Figures 4 and 6.

Based on the above data, there is evidence of an unpermitted release and/or threat of release into the soil or air of radioactive materials resulting from work performed as part of the Nation’s early atomic energy program. There is also evidence of a release and/or threat of release into the soil or air of chemicals resulting from work performed at the Site. However, it cannot be determined whether this release is attributable to the Nation’s early atomic energy program. These substances, both radioactive and chemical, may or may not have been remediated as part of Verizon’s voluntary cleanup program.

4.2 Surface Water Pathway

Surface water does not exist on or near the Site. The nearest surface water bodies are Meadowbrook Creek and Westbury Pond, which are greater than one (1) mile from the Site. The Site is located on a glacial outwash plain and at least four (4) on-site sumps (recharge basins) existed during the period of operations and were used to dispose of process wastewater. See Figure 2. Sumps, leach pools, and recharge basins have been used historically and remain as the primary means of handling liquid discharges and storm water run off in this area of Long Island.

Due to the Site distance from surface water and the use of recharge basins, no evidence of a release of hazardous substances, due to AEC-related radiological constituents or chemicals, to the surface water pathway has been found.

Based on the above data, there is no evidence of an unpermitted release and/or threat of release into the surface water of hazardous substances resulting from work performed as part of the Nation's early atomic energy program (e.g., radioactive materials and chemicals).

4.3 Ground Water Pathway

The regional groundwater flow on Long Island is reportedly separated by a groundwater divide that trends east to west along the north central portion of Long Island. Groundwater north of the divide discharges to Long Island Sound and groundwater south of the divide discharges into Great South Bay (Kilburn, 1979).

Four (4) major aquifers exist within the unconsolidated deposits that underlie Nassau County. From deepest to most shallow, the aquifers are the Lloyd Aquifer, Port Washington Aquifer, Magothy Aquifer, and the Upper Glacial Aquifer. The Magothy Aquifer serves as the principal source of fresh water on Long Island. The aquifer is approximately 600 feet thick and lies about 85 feet bgs. Due to high concentrations of clays in the upper portions of the Magothy Aquifer, most public water supply wells are screened in the lower Magothy Aquifer. Hydraulic conductivity of the Magothy Aquifer averages 50 feet per day (O'Brien & Gere Engineers, Inc., 2000). The Upper Glacial Aquifer is the uppermost hydrogeologic unit on Long Island (Kilburn, 1979). The hydraulic conductivity of the upper glacial aquifer ranges from 130-270 feet per day.

The four aquifers are all hydraulically interconnected to varying degrees (O'Brien & Gere Engineers, Inc., 2000).

The Site is located on a glacial outwash plain. Overburden at the Site consists of unconsolidated deposits. Hydrogeological data collected from investigations on and adjacent to the Site have focused on the Upper Glacial Aquifer and the Magothy Aquifer. Test borings indicate that the Site is underlain by relatively simple stratigraphy consisting of gravelly sands overlying silty fine sands. On-site boring logs and related literature indicate that surficial deposits are primarily sand with some gravel, extending to approximately seventy (70) feet bgs (GTEOSI,

2003a). Depth to groundwater is approximately sixty-seven (67) to over seventy-three (73) feet (O'Brien & Gere Engineers, Inc., 2000). The water table at the Site is relatively flat. Groundwater elevations measured within monitoring wells on and adjacent to the Site varied by approximately 0.23 feet across the Site bgs. Groundwater flow beneath the Site is generally toward the south. Predominantly, the underlying groundwater at the Site is impacted with PCE and, to a lesser extent, with TCE. The December 2000 investigative report states maximum concentrations of PCE and TCE were detected in groundwater at 2,000 ug/L and 3 ug/L, respectively. Data on undated Site figures reports that maximum levels of PCE and TCE detected in on-site groundwater wells are 5,600 ug/L and 720 ug/L, respectively.

The underlying groundwater at the Site is also impacted with nickel and radiological contamination, but the NYSDEC has verbally indicated that this portion of the groundwater contamination may be localized and may not extend beyond the boundaries of the Site itself. The potential exists that this contamination could eventually extend beyond the Site boundaries. December 2000 maximum results for U-238 in groundwater were 220 pCi/L (field filtered) (O'Brien & Gere Engineers, Inc., 2000). The groundwater flow is generally to the south-southwest. A municipal well field is located just over a mile south of the Site. See Figure 3. The City of Hicksville has been monitoring and treating the water at this facility for VOCs and semi-volatile organic compounds (SVOCs). Information regarding public water supply wells in the vicinity of the Site is from the NYSDEC GI Site files. Five (5) public supply wells are within one (1) mile of the Site. Another fourteen (14) public supply wells are within two (2) miles of the site. See Figure 3.

Historically, industries on Long Island have utilized supply wells for process water. NYSDEC indicated during discussions that other industries in the vicinity of the

Site use groundwater in their processes. Information regarding supply wells in the vicinity of the Site is from the NYSDEC GI Site files. Reports have shown that twenty-six (26) supply wells existed within one (1) mile of the Site. NYSDEC reports that some of these wells may have been abandoned (Stewart, 2005b). See Figure 3.

There are two (2) public water supply wells just more than one half mile northeast (up gradient) from the Site. Sampling events conducted by the Hicksville Water District between June 1989 and August 1990 revealed elevated levels of 1,1-dichloroethane, 1,1,1-trichloroethane, and PCE in one (1) well. The other well showed that PCE exceeded the maximum contaminant level (MCL) for NYS drinking water (O'Brien & Gere Engineers, Inc., 2000). Additionally, four (4) wells on the NCDPW site directly north and adjacent to the 140 property were sampled by GTE. When tested for PCE and TCE, two (2) wells had no significant detections. PCE was detected in one (1) well at 2 ug/L. TCE was detected in two (2) wells at 15 ug/L and 1 ug/L. The data from these wells, public supply and Nassau County, is representative of groundwater conditions upgradient of the Site.

There is much evidence that, over the years, numerous businesses in the vicinity of the Site may have contributed to on- and off-site groundwater contamination from many different chemicals. There are nine (9) USEPA Comprehensive Environmental Response, Compensation, and Liability Information System (CERCLIS) sites within one (1) mile of the Site. An off-site PCE groundwater plume is present down gradient of the Site at GI's inactive hazardous waste disposal site, which is immediately adjacent on the south side of the Site. The chlorinated solvent contaminants from each site apparently commingle to some degree, and the exact contribution from each site to this groundwater plume has not been established. GI is operating a groundwater treatment operation to the south of its property.

A sentinel well has been placed between the GI groundwater treatment operation and the public water supply well. The intent of this well is to identify when the southern edge of any groundwater contamination reaches it, thus providing advance warning to the public water supply plant. NYSDEC reports that the sentinel wells were last sampled on 11 November 204. Results from the sampling event indicated the following levels of volatiles: The 325-foot deep well detected 5.4 ug/kg of cis 1,2-DCE, 3.6J ug/kg of PCE, and 54 ug/kg of TCE. The sample from 450-foot deep well detected 5.1 ug/kg of cis 1,2-DCE, 22 ug/kg of PCE and 23 ug/kg of TCE (Stewart, 2005b)."

The GI groundwater treatment operation as well as the treatment at the municipal well field reduces the potential impact of the groundwater exposure pathway. However, current data is insufficient to adequately characterize the extent of groundwater contamination and potential exposures.

Based on the above data, there is evidence of an unpermitted release and/or threat of release into the groundwater of radioactive materials resulting from work performed as part of the Nation's early atomic energy program. Voluntary cleanup actions by Verizon may or may not have eliminated the source of this groundwater contamination. There is also evidence of a release and/or threat of release into the groundwater of chemicals resulting from work performed at the Site. However, it cannot be determined whether this release is attributable to the Nation's early atomic energy program.

5.0 COMBINED PATHWAY CONCLUSION

Verizon’s voluntary cleanup has addressed readily accessible contamination, thus limiting the soil and air exposure pathways. Limited data exist on contaminant levels and depths under Site buildings, as well as potential exposures inside of buildings. The data that are available, however, indicate that contamination remains in these areas. Completion of the soil and air pathway by such activities as removal of structures or other construction activities at the Site is possible. This presents a potential for a hazard to human health and the environment.

Due to the Site distance from surface water and the use of recharge basins, no evidence of a release of hazardous substances to the surface water pathway has been found.

The GI groundwater treatment operation as well as the treatment at the municipal well field reduces the potential impact of the groundwater exposure pathway. However, current data is insufficient to adequately characterize the extent of groundwater contamination and potential exposures. The potential for off-site receptor exposures via the groundwater pathway does exist.

Although data gaps limit assessment of exposures, a potential exists for exposure to current and future occupants of the Site and persons off-site to Site contaminants. Completion of groundwater, soil and/or air exposure pathways could present a hazard to human health and the environment.

6.0 SUMMARY AND CONCLUSIONS

The USACE has reviewed existing, readily available data on the Site. Based on that review, there is evidence of a release and/or threat of release into the environment of hazardous substances (specifically radioactive materials) resulting from work performed as part of the Nation’s early atomic energy program that is not a federally permitted release. However, considerable licensed work took place on the Site involving radioactive materials similar to those used in non-licensed work under the 1293 and other AEC contracts. Although there is a reasonable likelihood that some of the contamination on the Site resulted from non-licensed work, geographic segregation of non-licensed and licensed activities was not sufficient to state definitely the portions attributable to each. A more detailed analysis such as that in a CERCLA Remedial Investigation is recommended to determine which areas of the Site should be designated for FUSRAP cleanup.

While insufficient data currently exist to adequately define the extent of the risks, the possibility exists that further migration of contaminants related to the Nation’s early atomic energy program could occur. This migration may occur due to groundwater movement and/or the completion of groundwater, soil, or air exposure pathways, and may present a hazard to human health and the environment in the future.

There is also evidence of a release and/or threat of release into the environment of hazardous substances (chemicals) resulting from work performed at the Site. However, it cannot be determined at this time based on available evidence whether this release is attributable to the Nation’s early atomic energy program.

In accordance with FUSRAP and CERCLA, since there is an unpermitted release and/or threat of release of hazardous substance resulting from work performed as part of the Nation’s early atomic energy program, a FUSRAP response is appropriate and is recommended if other relevant criteria in ER 200-1-4 are met. Since significant data gaps exist regarding contamination extent in both soil and groundwater additional investigation is recommended.

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(GTEOSI, 2003c): Comprehensive Soil Remediation Program Work Plan for the Former Sylvania Electric Products Facility, prepared for GTE Operations Support Incorporated, dated January 18, 2002, Revised June 2003 (Revision 5).

(GTEOSI, 2003d): Letter from GTEOSI Agosntinelli to NYSDEC Robert Stewart regarding UST Removal from Service 100 Cantiague Rock Road, Hicksville, NY. September 15, 2003.

(Hays, 2004) Notes from NYSDEC files search by USACE David Hays. October 2004.

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(Kingsley, 1959): City of New York Division of Industrial Hygiene Report of Inspection (performed by I. Kingsley and W. Harris) of Sylvania Corning Nuclear Corp., Cantiague Road, Hicksville, NY, dated June 11, 1959.

(Kleinfeld, 1967a): State of New York, Department of Labor Letter to H. Watts (SEP) from M. Kleinfeld, dated February 17, 1967, concerning the release and declaration for non-radioactive use of Building #4, with exclusions. 1 page.

(Kleinfeld, 1967b): State of New York, Department of Labor Letter to H. Watts (SEP) from M. Kleinfeld, dated February 28, 1967, concerning the release of Building #2 and Sump #1 for non-radioactive use.

(Kleinfeld, 1967): Letter from M. Kleinfeld to H. Watts, Sylvania Electric Products, Inc., Hicksville NY regarding notification of cancellation of NY State Radioactive Materials License #325-0083, dated September 19, 1967.

(Klevin, 1958): Report, F.B. Klevin, NYOO, Inspection Date; June 9-10 1958, Title; Inspection of Sylvania-Corning Nuclear Corporation, INC.,New York, SNM-82,141.

(Nussbaumer, 1967): AEC Letter to J.E. Kreischor (SEP) from D.A. Nussbaumer, dated April 28, 1967. Concerning the renewal of AEC License #SNM-82 per SEP request. 1 page.
a. United States Atomic Energy Commission Special Nuclear Material License No. SNM-82, as renewed; Licensee: SEP; date issued April 28, 1967. 1 page.

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(Peterson, 1988): Peterson, D.S. 1988. Recharge rates in Nassau and Suffolk Counties, New York, U.S. Geological Survey, Water Resources Investigations Report 86-4181.

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(Rusinko, 1996): Letter from R.K. Rusinko, Senior Attorney, NYSDEC, to V. Gallogly, Assistant General Counsel, GTE, request for information regarding the Former Sylvania Corning Nuclear Corporation, with enclosures, dated June 3, 1996.

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(Unknown, 1996): Current Owners and Operators/Former Operators, Old Sylvania/Corning Facilities, Site Number 130040, six pages, dated October 30, 1996.

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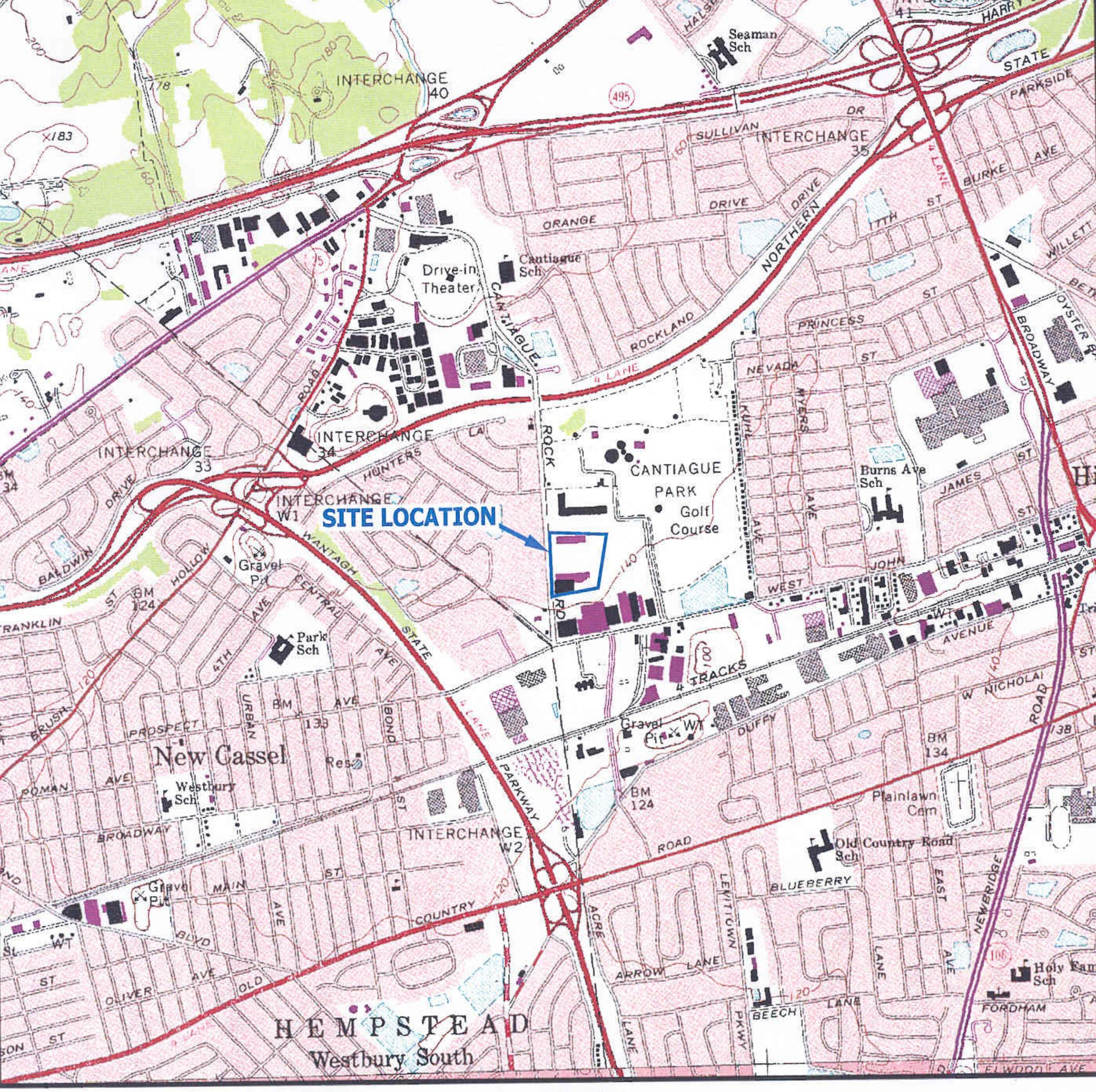
(URS, 2004b): Letter from URS Corporation to GTEOSI Jean Agostinelli regarding Tank Report, Cell 2, 140 Cantiague Rock Road, Hicksville, New York. July 12, 2004.

8.0 FIGURES



SCALE: 1:24 000

1 — 1/2 — 0 — 1 MILE

1000 — 0 — 1000 — 2000 — 3000 — 4000 — 5000 — 6000 — 7000 FEET

1 — .5 — 0 — 1 KILOMETER

NORTH

MAP REFERENCE:

PORTION OF U.S.G.S. QUADRANGLE MAP
7 ½ MINUTE SERIES (TOPOGRAPHIC)
HICKSVILLE, NEW YORK 1967
PHOTOREVISED 1979

NYSDEC: V 00089-1; URS: 27010-039

QUADRANGLE LOCATION

Figure 1
Site Location

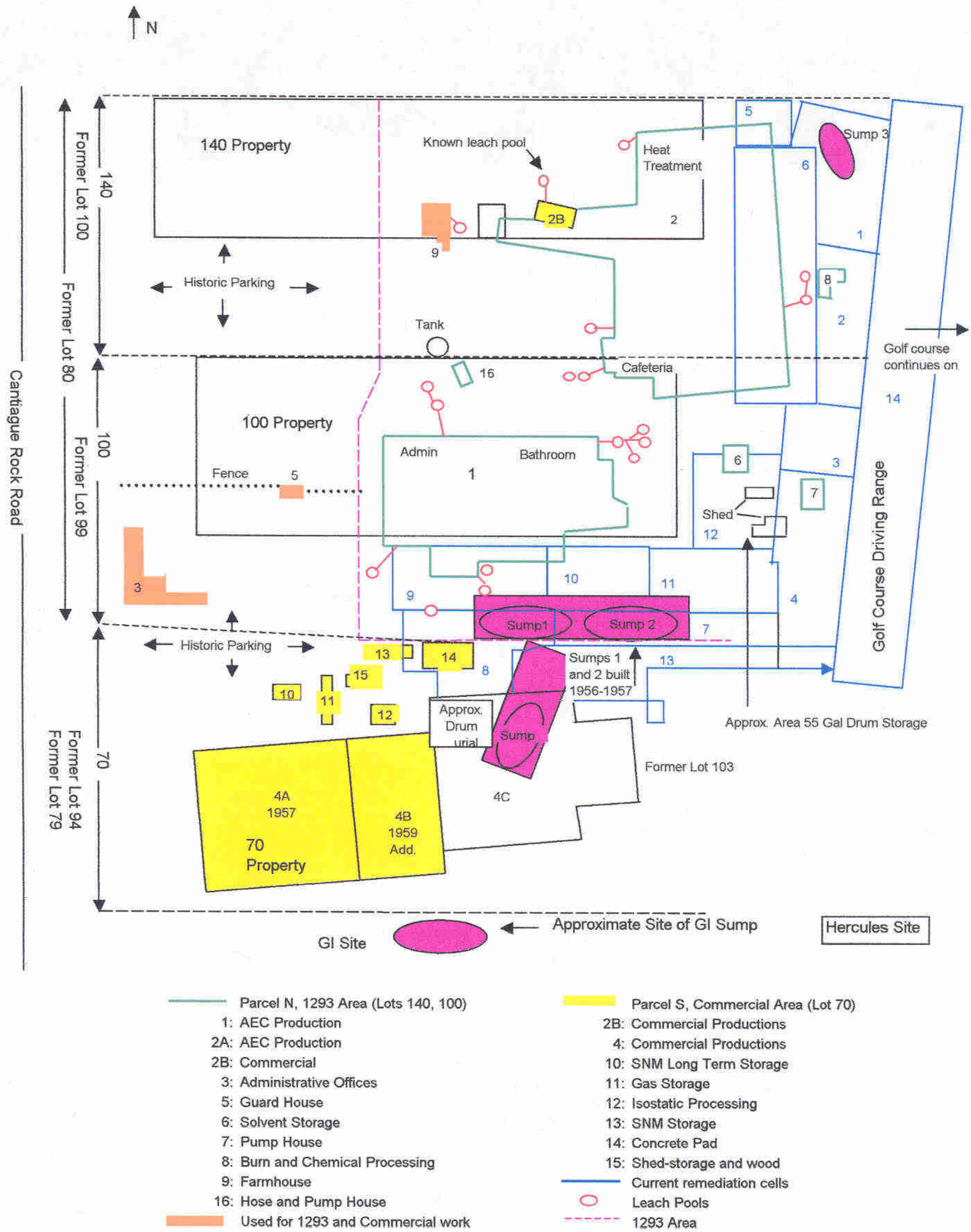


Figure 2
USACE Master Site Plan
Compiled from readily available data
24 November 2004

Figure 3
Known Industry and Public Supply Wells
Within 2 miles of the Sylcor Site
Hicksville, NY
(From NYSDEC GI Site Files)

Figure 4
Boring Locations and VOC Analytical Results

\hicksville_p2\gis\hick01\footprints\dec_voc_v2_e.mxd

Borehole	Depth From (Ft)	Depth To (Ft)	Tetrachloroethene (mg/kg)	Trichloroethene (mg/kg)
SB-017A	2.5	3	9.4	29 J
SB-024	4	5	52	5.7 U
SB-024	5.5	7		2.4 J
SB-024	5.5	7	7900 J	
SB-047	9.67	11.33	36	
SB-049	12	13	7.8	
SB-054	8	10	22	
SB-064	6	9	17	
SB-067	6	7.33	170 J	
SB-106	4.5	6	18000	15
SB-111	0	4	18 D	
SB-118	0	4	4.2 D	
SB-119	0	4	16 D	
SB-120	4	8	92 DJ	
SB-121	0	4	9.2 DJ	
SB-124	0	4	14 D	
SB-125	0	4	9.6	
SB-127	0	4	18	
SB-134	0	4	2.5 D	
SB-166	8	12	75	3.4
U-064	5.5	6	5	
U-066	3	3	7.6 J	
U-074	4	4	72	2.6 U
U-074B	20	20	140	
U-094	10	10	12	
U-110	2.5	3	71	
U-114	15	15.5	640	
U-114	15.5	19	500	15 U
U-117	28	28	44	1.3 U
U-128	6	6.5	8.1	

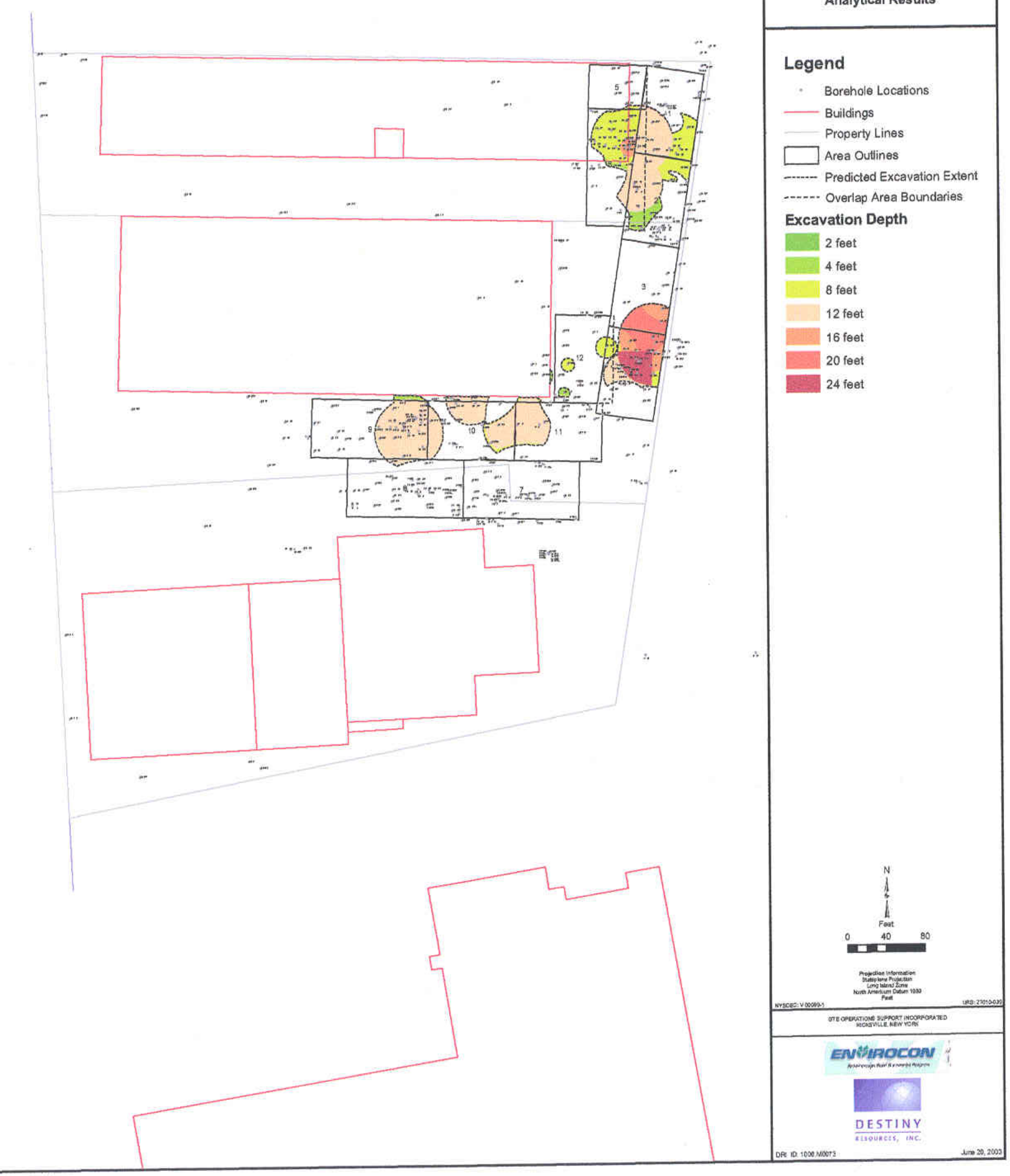


Figure 8b
Boring Locations
and
VOC
Analytical Results

GTE OPERATIONS SUPPORT INCORPORATED
HICKSVILLE, NEW YORK

ENVIROCON

DESTINY RESOURCES, INC.

June 20, 2003

Figure 5
Boring Locations and Radionuclide Analytical Results

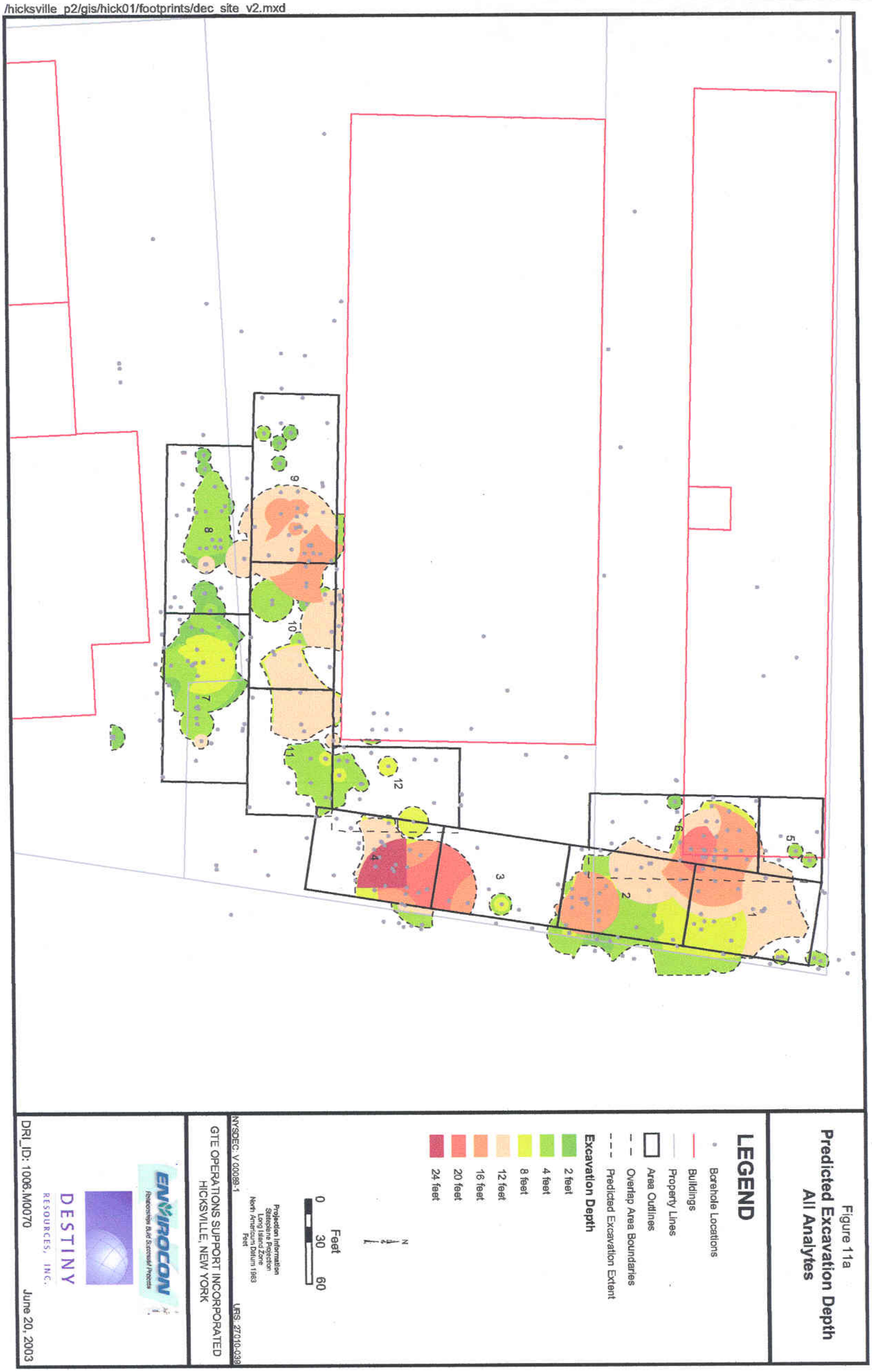
Borehole	Depth From (Ft)	Depth To (Ft)	Uranium 238 (pCi/g)	Thorium 232 (pCi/g)
SB-003	1	1.5	260 JI +/- 48	13 +/- 2.5
SB-004A	0.17	0.25	170 JI +/- 33	68 J +/- 13
SB-004A	0.33	0.42	43 JI +/- 9.4	
SB-004A	0.42	0.5	47 JI +/- 9.7	
SB-009	0	0.5		12 +/- 0.61
SB-009	0.5	1	2800 JI +/- 830	10000 +/- 2700
SB-009	1	2	120 JI +/- 22	17 +/- 2.9
SB-009	1	2	52 JI +/- 9.5	
SB-009	2	3	200 JI +/- 36	23 +/- 4.1
SB-009	3.83	4	1300 JI +/- 220	62 +/- 11
SB-009	6	0		6 +/- 1
SB-009B	1	2	720 JI +/- 130	22 +/- 3.8
SB-009D	0.5	1	190 JI +/- 33	
SB-009D	1	1.5	4400 JI +/- 800	4300 +/- 710
SB-009D	1.5	2	950 JI +/- 170	110 +/- 19
SB-009D	2	2.5	64 JI +/- 12	22 +/- 3.6
SB-009D	4	5	400 JI +/- 70	45 +/- 7.6
SB-009E	1	2	260 JI +/- 45	1.5 U +/- 3.9
SB-015	1	2	110 JI +/- 19	4.4 +/- 0.77
SB-015	4	5.5		4.4 +/- 0.79
SB-015	13.25	14.5	220 JI +/- 4.5	
SB-017A	4	4.5	62 JI +/- 11	
SB-017A	4.5	5	470 JI +/- 82	
SB-017B	2	4	51 JI +/- 8.9	
SB-017B	12	16.33		5.4 +/- 0.93
SB-023B	9	10	970 JI +/- 170	18 +/- 3
SB-024	5.5	7	4600 JI +/- 810	330 J +/- 59
SB-024	10	11	290 JI +/- 50	
SB-025	0	1.5	250 JI +/- 44	
SB-036	0	2	220 JI +/- 38	
SB-037	1	2		7.4 J +/- 3.4
SB-038	0	1.5	75 JI +/- 13	2.9 +/- 0.54
SB-040	0	2		5.5 J +/- 2.2
SB-041	1	1.5		24 +/- 4.3
SB-045	6	6.5	23000 JI +/- 4000	120 +/- 21
SB-049	12	13		9.9 +/- 2
SB-064	1.5	2	80 JI +/- 14	4 +/- 0.72
SB-066	1.5	2.5	[illegible] +/- 22	
SB-071	5.5	6	300 JI +/- 64	12 J +/- 2.1
SB-076	4	5.33	59 JI +/- 11	
SB-077	10.5	11	260 JI +/- 45	15 +/- 2.9
SB-078	10.5	11.5	61 JI +/- 11	
SB-079	6	6.17	470 JI +/- 82	18 +/- 3.1
SB-082	2	2.5	230 JI +/- 40	6.4 +/- 1.1
SB-105	2.5	3.33	180 JI +/- 32	
SB-105	4.5	5	6000 JI +/- 1100	4 +/- 1.4
SB-105	5.83	6.33	1400 JI +/- 240	
SB-106	5	6	46 JI +/- 8.3	
SB-107	7	8	44 JI +/- 8	
SB-111	0	2	82 JI +/- 25	4.7 +/- 0.59
SB-112	2	3	120 JI +/- 29	3 +/- 0.53
SB-113	13.5	14	450 JI +/- 85	69 J +/- 12
SB-113C	12	16	130 JI +/- 30	7 +/- 0.73
SB-119	12	16	220 JI +/- 43	
SB-120	12	16		5.1 J +/- 1.1
SB-129	2	2.17	41 JI +/- 18	
SB-129	2	3	71 JI +/- 16	
SB-133	0	4	110 JI +/- 24	
SB-136	0	4	130 JI +/- 27	
SB-145	12	16.33	2200 JI +/- 400	9.6 +/- 0.94
SB-151	1	1		30 J +/- 5.4
SB-152	8	14	120 JI +/- 27	12 +/- 0.90
SB-153	0.5	2	92 JI +/- 21	4.2 J +/- 0.41
SB-163	0	4	470 JI +/- 89	56 J +/- 10
SB-166	8	12	310 JI +/- 64	8.9 +/- 1.6
SB-169	12	16	120 JI +/- 25	
U-002	0	2	54 +/- 18	13.7 +/- 3.7
U-005A	1	1.5	153 J +/- 33	6.4 +/- 1.3
U-007	0.5	1.5	69 +/- 17	
U-012	2	3	83 J +/- 18	4.78 +/- 0.97
U-013	1.5	2.5	167 J +/- 38	
U-014	1.5	2.5	103 +/- 31	
U-016A	3.5	6.5	73 +/- 16	2.98 +/- 0.94
U-017	7	8	115 J +/- 22	
U-019	2	3.5	95 J +/- 18	11.7 J +/- 2.5
U-020	2.5	3	68 J +/- 14	
U-021	1.5	2	65 +/- 16	
U-024	2.5	3	43 +/- 14	
U-026	3	4	212 +/- 34	8.8 +/- 2.4
U-027	2	2.5	358 +/- 57	
U-031	11.5	11.5	66 +/- 16	
U-032	2.5	3	71 J +/- 15	3.47 +/- 0.71
U-033	1.5	2.5	90 +/- 20	
U-034	3	3.5	172 +/- 28	
U-034	3	3.5	262 J +/- 50	
U-037	3	3.5	591 +/- 79	
U-039	1.5	1.5	58 J +/- 12	
U-041	2.5	3	44 +/- 13	
U-042	1	2	112 J +/- 22	21.9 J +/- 4.4
U-042	14	16	46.4 J +/- 9.2	
U-043	2.5	3	296 +/- 43	2.94 +/- 0.99
U-046	2.5	3	800 +/- 100	4.59 +/- 0.99
U-046	2.5	3	720 J +/- 140	
U-048A	0.5	1	41 +/- 25	
U-054	2.5	3.5	148 +/- 28	6 +/- 1.7
U-058	0.5	1.5	163 J +/- 35	7.9 +/- 1.6
U-059	1.5	2.5		0 +/- 1.2
U-061	0.5	1.5	199 +/- 31	4.94 +/- 0.97
U-061	0.5	1.5	254 J +/- 51	
U-062	1	1.5	101 +/- 20	
U-066B	2.5	3		3.9 +/- 1.2
U-067	2	2.5	542 +/- 72	
U-067	2	2.5	630 J +/- 120	
U-068	2	3	283 +/- 43	
U-075A	7	7.5	75 J +/- 15	43 +/- 11
U-075A	7	7.5		50 +/- 9.4
U-075B	2.5	3	42 +/- 16	24 +/- 6.4
U-075B	6.5	7		5 +/- 1.4
U-077	2.5	3	45 +/- 13	
U-078	2.5	3.5	202 +/- 37	
U-079C	3	3.5	99 +/- 22	
U-082	1.5	2	52.5 J +/- 9.8	
U-083	2.5	3	90 J +/- 17	
U-085	2.5	3	73 +/- 23	
U-087	2.5	3	230 J +/- 44	
U-091	2.5	3	119 J +/- 27	2.58 +/- 0.66
U-093	1	2.5	75 J +/- 14	
U-095	2.5	3.5	124 J +/- 24	
U-099	11	11.5	94 J +/- 19	
U-100B	3.5	4	43 +/- 13	
U-103	2	2.5	54 +/- 15	
U-104	1	1.5	50 +/- 14	
U-105	1	1.5	75 J +/- 15	
U-109	2	2.5	39 +/- 17	
U-110	1	1.5	77 J +/- 15	3.89 J +/- 0.77
U-114	1.5	4	243 J +/- 47	4.5 J +/- 1.1
U-114	6	7	540 J +/- 110	11.6 J +/- 2.6
U-115	2	3	121 J +/- 24	
U-117	1	2.5	102 J +/- 20	
U-118	7	8	50 +/- 13	
U-125	3	3.5		2.8 +/- 1.2
U-132	12	13	258 J +/- 54	
U-132	13	13.5	680 J +/- 150	
U-135	7	8	40 +/- 13	

/hicksville_p2/gis/hick01/footprints/dec_rad_v2_e.mxd

Figure 6
Boring Locations and Metals (Nickel) Analytical Results

Borehole	Depth From (Ft)	Depth To (Ft)	Nickel (mg/kg)
SB-015	13.25	14.5	685
SB-071	12	13.3	1820
SB-079	12	13	1530
SB-081	14.5	15.5	1850
SB-105	4.5	5	878
SB-145	0	6	910
SB-153	0.5	2	1790
SB-166	6	12	20100 D

Figure 7
Predicted Excavation Depths - All Analytes



PART 70 INSPECTION

SYLCOR DIVISION
Sylvania Electric Products, Inc.
Hicksville, Long Island, New York
Bayside, Long Island, New York

Dates of Inspection: March 13, 14, 1961 (Announced)

Persons Accompanying Inspectors:

None.

Persons Contacted:

Hicksville

D. B. Metz, Manufacturing Manager in charge of commercial and contract facilities

Grant LaPier, Plant Manager
Sheldon Strauss, Engineering Specialist, Criticality Engineer
Richard Alto, Production Control
Milton Boll, Accountability Manager
Henry Grieb, Chief Safety Engineer

Bayside

W. J. Donahue, Accountability Representative

DETAILS

9. Introduction

An inspection of the activities related to the use of special nuclear material under License Nos. SNM-82 and SNM-141 was conducted by John R. Sears and Paul B. Klevin of the New York Operations Office at Hicksville, Long Island, New York on March 13 and 14, 1961, and by P. B. Klevin at Bayside, Long Island, New York on March 14, 1961.

Under SNM-82, Sylcor is engaged in the fabrication of fuel elements. The inspection consisted of a visual inspection of the plant, discussion of administrative organization, procedures, methods and procedures for the prevention of criticality hazards, accountability records and control, radiological health and safety and fire protection. Records pertaining to the aforementioned were reviewed.

10. Background Information

An inspection of special nuclear licenses SNM-42 and SNM-141 was conducted on June 9 and 10, 1958. The inspection report was transmitted to Headquarters (Marvin M. Mann) on August 20, 1958. DL&R, in a letter dated September 16, 1958, informed the licensee of the items of noncompliance. (No copy of this letter is available in NY's files.) In a letter dated September 29, 1958, the licensee, (Garth W. Edwards) informed DL&R of the corrective action taken with regard to the items of noncompliance. On November 6, 1958, DL&R acknowledged receipt of the licensee's letter of September 29, and informed the licensee that with the exception of compliance with the conditions of the license regarding film badges, urinalysis and blood counts, it appeared that adequate corrective action had been taken to correct the other items of noncompliance noted in the inspection report. DL&R also informed the licensee that any request for relaxation in their monitoring procedures should include detailed reasons for requesting such relief.

An inspection of the source material license, C-3700, at Sylvania-Corning Nuclear Corporation was conducted on February 17, 1960. The inspection report was transmitted to Headquarters on May 20, 1960, and on May 26, 1960, the report was transmitted by M. M. Mann, Headquarters, to DL&R. On July 22, 1960, a letter was sent by DL&R to the licensee listing the items of noncompliance and requiring corrective action.

On December 8, 1958 a teletype was sent to Headquarters reporting an exposure to one of the licensee's personnel of 7 r beta and 60 mr gamma. On January 20, 1959, this office transmitted to Headquarters a report of investigation regarding the film badge exposure. On March 23, 1959, a memo was transmitted from Headquarters to DL&R concurring with the NY Inspection Division investigation report that the exposure appeared to have resulted from backscattering of a fluoroscope and was inadvertently interpreted as being a beta exposure, and also that no further investigation was required, and the case was closed.

On December 8, 1960, H. Grieb, Sylvania-Corning Nuclear Corporation, informed this office by teletype of a 5.7 r exposure to an employee, D. Newman. On December 17, 1960 the overexposure was investigated by this office, and the report of investigation was transmitted to Headquarters on January 17, 1961. In a memo dated March 6, 1961, the investigation report was transmitted to L. R. Rogers, together with the recommendation for citation, in which Headquarters concurred with the findings of NYOO and suggested that the licensee be cited for the item of noncompliance noted during the investigation.

On January 1, 1961, Grant LaPier, Sylvania commercial plant, informed DL&R that Sylvania-Corning (Sylcor) Nuclear Corporation became a division of Sylvania Electric Products, Inc. and henceforth, it will operate as the Sylcor division of Sylvania.

No further correspondence follows.

All of the details below pertain to Licenses SNM-82, SNM-141 and C-3700, unless otherwise noted.

11. <u>Organization and Administration</u>

On January 1, 1961, Sylcor became a division of Sylvania Electric Products, Inc., which in turn is a subsidiary of General Telephone and Electric Corporation. Mr. Lee Davenport, General Manager of Sylcor, reports to Gerald Moran, who is Vice President of the Chemical Metallurgy Division of Sylvania Electric Products. D. B. Metz stated that since a recent reorganization, his title is that of Manufacturing Manager. Metz is in charge of both the AEC contract plant at Hicksville as well as the commercial facility. Metz reports to Lee Davenport. Metz stated that G. W. LaPier is the Plant Manager of the commercial facility, while he (Metz) acts as Plant Manager of the AEC facility. Metz said the reorganization was primarily due to the necessity of cutting down expenses, such as the services of a controller, legal, etc. He said that the fabrication operation is considered an austere program, and that Hicksville must show a profit or break even in order to stay on in business. He added that the first three months of 1961, January, February and March, have shown a profit for the Hicksville operation.

Exhibits "A", "B", and "C" contain the organizational chart and the mode of reporting through channels. Henry Grieb, Chief Safety Engineer, as noted in Exhibit "A", reports to R. Haffner, Supervisor of Industrial Relations, and thence to L. Davenport, General Manager of Sylcor Division. Dr. John L. Zambrow is the Engineering Manager in charge of the Bayside activity. Under Zambrow, as noted in Exhibit "B", are several groups consisting of the Nuclear Engineering Group, Chemistry & Ceramics, Metallurgy, Powder Metallurgy and Shop divisions. Sheldon Strauss, Engineering Specialist in the Nuclear Engineering Group, reports to Zambrow under the Bayside operations. Strauss also acts as Criticality Engineer for the Hicksville operations. Milton Boll, in charge of Security and Accountability, reports to LaPier and Metz. Richard Alto, in charge of Production Control, reports to Boll.

A total of 69 personnel work in the commercial facility, of which 8 of these personnel are engineers or technicians.

12. Nuclear Safety

A. General

Fuel fabrication operations throughout the entire plant were observed, storage vaults were inspected, accountability and process records were reviewed and operator and supervisory personnel were interviewed. Spot checks of individual batches in process and in storage were made to determine the degree of enforcement of criticality control procedures.

Sylcor personnel most intimately associated with the establishment and enforcement of criticality control procedures accompanied Compliance Division personnel during the inspection. Included in this group were the following:

Grant LaPier	-	Plant Superintendent
Sheldon Strauss	-	Criticality Engineer
Milton Boll	-	Accountability Manager
Henry Grieb	-	Safety Engineer
Richard Alto	-	Production Engineer

B. Criticality Control Procedures

Criticality control procedures at Sylcor have been standardized to include all types of special nuclear material currently in process. These procedures, though general enough to provide some degree of flexibility in operations, are comprehensive and provide batch limits for all chemical, physical and geometrical forms normally encountered in production. The control system is based predominantly on definite and prescribed mass limitations. However, geometry, concentration and the probability for moderation have been factored into establishing some of these mass limits.

Criticality control procedures, as they were described by Mr. Strauss and as they were observed in practice during the inspection, are summarized below:

(a) Criticality Limits have been established by the Criticality Engineer, Mr. Strauss. These limits are expressed in terms of grams of contained U-235 permitted at any one operating station at one time. Criticality limits are established on the basis of the type of material under consideration, its physical form and the type of operation performed.

(b) Operations Stations have been categorized into three basic types: (1) High Limit Stations, (2) Normal Stations, and (3) Soluble Step Stations. This has been done to weight the criticality limits for a particular station according to the probability that the operation presents for achieving moderation, reflection or dissolution of the uranium.

(c) Criticality Limit Reports are prepared by the Manufacturing Department prior to initiating material flow through the plant on a new job. The primary function of the limit report is to translate the U-235 weight limits established by the Criticality Engineer (Criticality Limits) into numbers of pieces that may be handled at each operating station. The limit report, therefore, indicates sequentially all process setups, the form of the material as it enters and leaves each operation station and the number of pieces permitted at each station.

(d) Route Cards are prepared by the Accountability Representative from the criticality limit reports. The route cards accompany each batch of material as it flows through process. Route cards indicate allowable batches at each of the operating stations scheduled by the card. Route cards and operating stations (criticality stations) are color coded to aid the operator in differentiating between High Limit Stations (blue), Normal Stations (white, and Soluble Step Stations (red).

(e) Operations stations throughout the plant are delineated by yellow borders painted on the floors. The identification of operating stations for material control purposes is maintained by signs indicating the number of the station. Color coding on the sign identifies the category of the station. Only one batch of material is permitted within the borders of an operating station at one time. The borders of adjacent operating stations are a minimum of one foot from each other.

(f) Movement of individual batches of special nuclear material from one operating station to another is done in carrier racks. Carrier racks are fitted with side spacers six inches wide to maintain a minimum spacing of 12 inches between batches if two racks are placed side by side. Carrier racks may be moved to the next station by operators only if the route card accompanying the batch has been validated by accountability.

(g) In-process storage stations are provided to prevent the accumulation of material at operating stations. Individual batches are stored in the carrier racks used for transporting batches between operating stations. Storage facilities consist of metal cabinets which provide a minimum spacing of one foot between individual batches.

During the inspection tour of the Hicksville fuel fabrication facilities, it was observed that the criticality control procedures for material flow described above were in fact being followed. No deviations from these procedures were observed in the process areas. Batches of special nuclear material listed on criticality limit reports were found to be in agreement with the criticality limits established by the Criticality Engineer and approved by DL&R as an amendment to License SNM-82. Operating stations were clearly marked by painted yellow lines. In no instance was more than one batch of special nuclear material found within the confines of an operating station. It was also observed that carrier racks were used for the transfer of all batches from one station to another. Route cards accompanied all individual batches of material and in all instances reflected the proper quantity of pieces within the carrier racks. Batches indicated on the route cards also reflected proper batch limits as specified by the validated criticality limit reports and by the criticality limit tables.

In-process storage was also found to be in accord with the established procedure for such storage. Carrier racks were utilized to store batches on shelves of all storage racks and cabinets. Batches in process storage facilities were also spot checked and were found to be in agreement with quantities listed on the route cards accompanying each batch.

Log books in the soluble step stations were examined and found to be detailed and up to date. Results of chemical analyses of etch solutions are recorded in these logs. These analyses indicate that negligible amounts of U-235, in most cases less than one gram, have been found in the caustic and acid batch solutions. Records are also kept of the total number of plates immersed in an etch solution. Solutions are routinely rejected and replaced after a specified number of plates have been etched.

C. <u>Storage Facilities and Procedures</u>

Storage facilities at Hicksville consist of numerous in-process storage cabinets located in the fabrication area, a main vault for raw materials and process material and a large caged storage facility for more permanent storage.

According to the Accountability Representative, general storage procedures require (a) storage in batches consistent with quantities appearing in the criticality limits, and (b) separation of individual batches by a minimum of one foot. Steel racks in the main vault and in the caged storage area are designed to achieve minimal spacing requirements. Some of the wall racks are equipped with continuous shelves which are suitably marked to provide isolated storage areas at least one foot apart.

Spot checks of process materials stored in the main vault and in the caged storage area revealed that individual batches were limited to quantities of contained U-235 consistent with those appearing in the criticality limits (Appendix B of application for amendment to SNM-82 dated November 25, 1958).

D. Miscellany

(a) A ten channel Victoreen area monitoring system has been installed and is currently in operation at the Hicksville plant. The sensing elements are gamma sensitive and an audible and visual alarm system is actuated at a radiation level of 15 mrem/hr. Warning lights located at each sensing element indicate which sensory bar reached the trip level. Ten read-out meters are located in the security guard shack at the main gate to the plant. These are provided to assist security personnel in coordinating evacuation and emergency procedures in the event of a nuclear incident. Mr. Grieb, Chief Safety Engineer, stated that a complete evacuation of the plant was rehearsed periodically. Emergency procedures were observed to be posted at numerous locations throughout the plant.

(b) The Superintendent of Production is primarily responsible for the enforcement of criticality control procedures at Sylcor. The Safety Engineer conducts continual independent inspections of overall safety procedures. As part of this independent audit, he determines the degree of enforcement of nuclear safety procedures and reports his findings at weekly staff meetings with management. Mr. Grieb stated that in his inspection tours, he had observed approximately ten violations of criticality control procedures in the past two years. He said that in each instance, he had personally reprimanded the operator and his foreman, and that in at least one instance where an operator had been guilty of a second violation, a letter had been sent to the operator by the plant manager.

13. Facilities and Security

A. SNM-82

A new commercial fabrication plant, approximately 200' x 800' has been constructed on Sylcor, Hicksville property at a location approximately 200' from the contract facility. The two facilities are totally enclosed and separated by wire fencing. The commercial facility contains small rolling mills, extrusion presses, a large machine shop, furnaces, degreasing, acid cleaning, accountability, vault storage, change room facilities and inspection departments, which are involved in the fabrication of fuel elements. Each of the manufacturing areas is set up as operating stations, and yellow paint on floors is employed to mark out each particular operation station or area. Within the commercial facility, there has been constructed a separate area called the control area. This area, which was completely sealed off from the rest of the plant by wall partitions, contains a change and wash room facility, furnaces, extrusion presses and machine shop equipment. The operations previously performed in this area had been concerned with the fabrication of the PRDC depleted uranium blanket fuel elements. The area is no longer considered a separate control area within the regulated restricted commercial plant. The facilities and equipment within this area are now employed to supplement the facilities located in the rest of the plant. At the time of the inspection, only a few operations involving special nuclear materials were in progress.

B. SNM-141 and C-3700

The facilities at Bayside are located primarily within a caged, guarded wing on the second floor of the building. The facilities include metallurgical, chemical and analytical laboratories. Dry boxes and other enclosures are employed. At the time of inspection at Bayside, no work was being performed. According to Henry Grieb, the program at Bayside is at a standstill. At the time of inspection, the special nuclear material and some licensed source material were stored in a properly posted storage room. Some source materials were also contained within locked cabinets in several of the laboratories located on the second floor. No special nuclear material was stored anywhere but within the storage room. W. J. Donahue, Accountability Representative, is the only one who has a key to the aforementioned locked storage room, which is located on the first floor.

At Hicksville, personnel employed in the work areas are equipped with safety shoes, socks, pants, shirts and plastic aprons. The change areas are complete with both dirty and clean locker areas and showers. A monitor employed in the change area is used by all employees to check for radioactive contamination.

Both the Hicksville and Bayside facilities are enclosed by 6' to 8' steel fences and are patrolled by a security force 24 hours a day. Access to vaults or storage areas in Hicksville is restricted by Boll and Alto. Lock combinations of the accountability vault are available to the aforementioned individuals and plant security. As noted above, W. J. Donahue, Accountability Representative, Bayside, has the only key to the storage room containing source and special nuclear material. This key is also available to plant security.

Inspection 1961

14. Licensed and Contract Activities

A. Licensed Activities

Both Metz and LaPier reported that the following licensed jobs have been or will be done in the future:

1. Triton (France) 88 fuel elements, 90% enriched
2. Sweden, 225 fuel elements, 90% enriched
3. Belgium BR-2, 40 elements, 90% enriched
4. University of California, 2 elements, 93% enriched
5. University of Maryland, 2 elements, 90% enriched
6. General Atomics, 250 foil plates, 90% enriched
7. Turkey, 35 elements, 90% enriched

The aforementioned jobs were reported to be active, while two jobs, involving fabrication of 53 elements, 90% enriched made for the Dutch, and 40 elements, 20% enriched made for the Portuguese, were reported to be inactive.

B. Contract Activities

Metz stated that Sylcor has a contract to fabricate 1000 fuel elements containing 93% enriched uranium over a one year period for the Phillips Petroleum Company under contract C-225. Sylcor also has a contract to fabricate 500 fuel plates, 93% enriched for Spert IV under contract C-223.

15. Description of Fabrication Operations

According to LaPier and Boll, the following steps are employed in the fabrication of fuel elements:

1. Material is received, identified by a process number, and brought to the incoming vault storage area.

2. Accountability personnel enter the vault to remove raw material in order to make up charges. The charges are made up in the accountability room.

3. The material is then taken to the melt furnace area, and placed in a vacuum induction furnace. Criticality limits for this area are 2 kgs of U-235 per melt.

4. After the material is made into an ingot, it is taken to a heating furnace, heated, and then rolled to the proper dimensions.

5. Punch cores are made, and then the piece is degreased and taken to process storage. In the process storage facility, the cores, the skull, the dross and scrap are placed on shelves which are located on 18" centers.

6. The cores are then pressed into picture frames, taken to the heating furnace and rolled in a rolling mill. After rolling, the material is then brought back for in-plant storage.

7. Other operations that are then performed on the material consist of cutting off and forming curvatures on the plates, inspection of the plates, acid cleaning, inspection assembly of the element, machining, and welding.

8. Finished elements are checked by Production Control and further inspected both prior and after assembly.

The above operations are basically the same as reported in the initial inspection report.

16. Inventory

The following is an inventory of the licensed, source and station material on hand as of March 3, 1961:

Hicksville - License SNM-82

(Licensed material)

Project No.	Nat. U (g)	U-235 (g)	Name	% of U-235
3001	10817.75	9710.75	Sweden	90
3006	45893.26	9088.13	Pegasse (France)	20
3007	169.03	151.64	Jason (Netherlands)	90
3017	1490.70	1332.64	Saclay (France)	90
3020	1637.98	1468.70	Buffalo	90
3026	4282.04	3999.50	Convair	93
3027	871.95	781.35	Allis Chalmers	90
3034	45.93	42.83	California	93
3044	17565.98	15775.07	Triton (France)	90
3045	1469.38	1369.66	Maryland	93
3105	1313.47	1224.66	General Atomics	93
3804	25.57	23.80	McMasters (Canada)	90
3805	6959.61	6246.66	Dutch	90
3823	1,041,343.88	266,295 .91	PRDC (No longer active-storing for PRDC)	25.6
3829	10.95	9.83	BR-2	90
3833	46.13	9.15	Florida	20

Project No.	Nat. U (g)	U-235 (g)	Name	% of U-235
3842	101.24	20.11	France	20
3846	9519.02	8881.62	NASA	93
3902	4.36	4.07	Nucledyne	93
3905	10.04	8.99	Israel	90
3907	22.55	20.34	Curtiss-Wright	90
3909	1214.57	1131.32	Alco Products	93
3910	30948.79	6136.33	Portugal	20
3916	14521.79	13033.98	BR-2	90
3919	2750.15	545.42	Saclay	20
20% stock	4277.55	836.19	---	20
90% stock	35969.54	32318.62	---	90
93% stock	9824.55	9152.71	---	93
Totals	1,243,057.76(g)	389,619.98(g)		

Source License C-3700

Project No.	Depleted Uranium	Name
3906	8207.60 (grams)	Alco Products
3823D	16030.69 (lbs.)	PRDC
Depleted stock	67578.00 (grams)	----
4823-01A	509.80 (lbs.)	PRDC
4823-01B	1140.13 (lbs.)	PRDC
Total	17847.62 (lbs.)	

Station Material

Project No.	Nat. U (g)	U-235 (g)	Name	Contract
3021	227.13	211.59	Alco Products	AP-1793
3029	11802.96	10989.50	Phillips	C-223
MTR-ETR "U" Control	189,397.67	176,392.37	"	C-225
3040	16690.63	15544.19	"	"
3041	10332.29	9623.41	"	"
3042	3597.69	3350.60	"	"
3043	2671.35	2488.06	"	"
4845	25856.96	24105.84	Alco Products	AP-1100
3904	11271.90	10500.98	NYOO	AT(30-1)-2370
3837	1812.93	1688.58	Alco Products	AP-1050
	273,661.51(g)	254,895.12(g)		

Depleted Station Material

Project No.	Nat. U	Name	Contract
3837D	6 kgs (Depleted)	Alco Products	AP-1050

Bayside - License SNM-82

There is no material on hand under this license at the Bayside facility.

License SNM-141

Scrap	-	5.13 grams, 93% enriched (General Atomics)
Scrap	-	3.6 grams, 93% enriched (Davison Chemical Co.)

Source License C-3700

Natural Uranium		Thorium	
Engineering -	103.16 lbs.	Scrap -	9.00 lbs.
Scrap	97.26 "	Stock	0
Stock	175.18 "		
Totals	375.60 lbs.		9.00 lbs.

Depleted Uranium - 247.83 lbs.

17. Waste Disposal and Transfers

A. Disposal

Under License SNM-82, on July 6, 1960, 150 - 55 gallon drums containing less than 75 mc of U-235, U-238 and natural uranium in the form of contaminated rags with crucibles, filters and firebrick, etc. were transported by truck to Oak Ridge and buried at the Oak Ridge disposal area. On December 16, 1960, 285 drums containing approximately 580 mc of U-235 and U-238 in the form of contaminated wipes and sludge were transported to Oak Ridge by truck and buried at the Oak Ridge disposal site. According to the waste disposal record, the major contaminant was depleted uranium in the form of sludge. The sludge, which was mixed with concrete, is a result of the PRDC operations.

Under License SNM-141, no waste disposal or transfers were made. Donahue, Accountability Representative, Bayside, reported that a shipment of contract scrap and wastes was sent to the U.S. Ammunition Depot in Earle, New Jersey on 11/29/60. The shipment consisted of 17 - 55 gallon drums containing a total of 5571 pounds of wastes in the form of residues, filters, wipes, etc., which were concreted. Donahue stated that all licensed material had been sent to Hicksville.

B. Transfers

A review of the accountability records showed that scrap shipments of mixed uranium had been sent to Engelhard Industries and Davison Chemical Company during the period from 7/1/59 to 9/19/60. A list of the scrap shipments for recovery and the dates of shipment are listed below:

Date Shipped	To	U	U-235
7/1/59	Engelhard Industries	361.65	337.12
7/1/59	"	1,363.86	1,271.89
7/1/59	"	467.57	421.87
11/18/59	"	630.05	586.99
11/18/59	"	1,283.34	1,195.57
11/25/59	"	549.39	511.79
11/25/59	"	357.53	333.00
7/10/59	Davison Chemical	44,792.95	8,900.36
7/8/60	Engelhard Industries	4,982.54	4,640.02
8/17/60	"	1,822.40	1,697.30
9/8 & 9/19/60	Davison Chemical	62,231.58	23,933.68

18. Radiological Health and Safety

A. Organization

Henry Grieb, Chief Safety Engineer, is responsible to Robert Haffner, Manager, Industrial Relations. Previously, Grieb was responsible to Dr. John Zambrow, General Health and Safety, for the programs at both Bayside and Hicksville. Grieb has one assistant, a Joseph Krolineck, who reported to Grieb on January 1, 1961. Previously, Krolineck was a technician performing dry box operations at the Hicksville plant for 17 months prior to January 1, 1961. Krolineck reported that he has no formal training and is presently undergoing on-the-job training under Grieb. Grieb has been doing health and safety work for Sylvania-Corning (Sylcor) since 1948. He said that he spends 99% of his time at Hicksville and 1% of his time at Bayside. Grieb stated that he reviews and inspects operations involving criticality as well as health and safety, and noted that Sheldon Strauss sets up criticality limits for each job operation. He (Grieb) sees to it that the operations are performed in accordance with the specifications set down by Strauss. Grieb stated that the two previous assistants he had, J. Meely and R. F. Andre, have been let go due to the austerity program and cut-down in sales, and that just Krolineck, himself and a secretary comprise the health and safety group.

B. Written Instructions and Training

According to Grieb, written instructions have been supplied to all personnel. Grieb made available copies of both special nuclear and source material safety instructions, which are included in the licensee's file. These instructions are written on blue, white and red paper. The instructions on blue paper specifically govern the handling of special nuclear materials (high criticality stations, SNM); the instructions on white paper (normal limits stations); and the instructions in red (cleaning stations). Special instructions for blue, red and white criticality stations include the stations' rules for transportation to and from the station and operating safety instructions. Blue, white and red paper instructions also contain instructions for the handling of special nuclear materials noted in the three aforementioned categories. The instructions for handling the specific materials throughout the plant are composed of general rules on storage, performance of operations, accountability and description of work stations. Rules governing the transportation of material throughout the plant are also on hand. Copies of all instructions noted above are included in the licensee's file.

C. Medical Program

Under Dr. R. Young, the licensee's physician, physical well-being examinations are provided for all employees both at Hicksville and Bayside. These examinations, performed every 18 months, include chest X-rays, blood counts and bioassays. Pre-employment and termination physical examinations are also given by Dr. Young. The highest urine sample found was 2 ug U/l for a 24 hour sample. The sample was analyzed by Controls for Radiation.

D. Personnel Monitoring

Approximately 47 persons are under the film badge program. Film badges are worn by accountability, inspection, fluoroscope, chemical cleaning and melting personnel as well as X-ray users. Film badges had been supplied by Nucleonic Corporation of America on a weekly basis, but since January, 1961, the Landauer Corporation of Chicago has been supplying Sylcor with film badges on a biweekly basis.

The only film badge records available were for the last quarter, ending December 31, 1960. Grieb stated that the previous film badge records were being put on IBM cards in order to get all the information required under the new Part 20, and that the IBM unit had been shut down. He reported that he was presently accumulating all 13 week totals and cumulative exposure totals. He pointed out that his secretary was performing this tedious operation at the time of inspection. The inspector noted that Grieb's secretary was, in fact, working on previous personnel exposure records in an attempt to bring all records up to date in order to comply with the requirements of the new 10 CFR Part 20. The records reviewed for the quarter ending December 31, 1960, with the exception of David Newman, a Sylcor machinist who showed 5.7 r beta exposure, showed exposures ranging from between zero to 150 mr for a two week period. Most of the badges showed less than 25 mr for a two week period. Investigation of the Newman incident on December 22, 1960 indicated that the exposure was to the badge only and not to the individual. Newman is presently engaged in machining operations and is not involved with radioactive material.

E. Radiation Monitoring Instrumentation

The following operable instrumentation was on hand at the time of this survey:

3 ore lokator NCA gamma survey meters, range 0-25 mr
1 Juno, range 0-5 r
2 Sampson alpha-gamma survey meters, range 0-12,000 cpm
3 Eberline gas alpha proportional counters, range 0-100,000 cpm
1 Tracerlab monitor, range 0-20,000 cpm
Tracerlab super scaler and alpha scintillation counter and scaler for analyzing air samples

F. Survey Program

1. Direct Radiation Surveys

Incoming and outgoing shipments are checked for contamination both by smear samples and by direct radiation readings by Grieb or his assistant whether or not these shipments are simply going to and from Hicksville and Bayside or to another licensee. Radiation surveys are made of all new operations and are periodically taken at various locations throughout the plant. Surveys are also made at the 60 kv fluoroscope and 150 and 250 kv X-ray machines on a quarterly basis.

2. In-Plant Air Surveys

Grieb reported that aerosol samples are periodically taken using a Hudson air gas beam, and 1-1/8" diameter Whatman 41 filter paper is used. He stated that air samples are taken at all new operations or when operational changes are made. He added that general air breathing zone and processing samples are taken at all new or changed operations. At least two air samples per year were reported to have been taken by Grieb. Records of these samples reviewed showed the highest result at both Hicksville and Bayside to be 100 dpm per cubic meter. Most samples were less than 30 dpm. Results at both Hicksville and Bayside were reported in dpm per cubic meter and not in uc/ml as required by the regulations. Grieb, in the presence of the inspectors, started making adjustments to change the dpm per cubic meter to uc/ml. Grieb reported that since June, 1960, there were not too many operations in progress, and that few air samples had been taken.

3. Stack Effluents

Grieb stated that periodic stack effluent samples are taken using isokinetic sampling techniques. He added that on the APPR operation, the cut-off, grinding and vacuum melt operations were hooked up to electrostatic precipitators located in the exhaust. A record dated 11/9/59 measuring the discharge effluent from #4 exhaust hood which contained the precipitator unit was noted to be recorded as 132 and 101 dpm per cubic meter for the two samples collected. These samples were collected without benefit of an isokinetic sampling device. On June 13, 1960, results of the two samples were noted to be reported as 1.3×10^{-11} uc/ml for sampling of duct #2 and $.17 \times 10^{-11}$ uc/ml for a sample taken at duct #3. Grieb, in the presence of the inspectors, changed the dpm per cubic meter readings recorded for November 13, 1959 to uc/ml.

4. Smears

Smear samples were taken using a Whatman 41 filter paper for a 100 cm^2 area. As noted prior in the report details, smears are taken on all outgoing and incoming shipments as well as in the general process areas. Smears of incoming shipments range between 35 to 120 alpha dpm/100 cm^2. Smears taken on outgoing shipments, however, were less than 70 dpm/100 cm^2. The highest smear found in the melt room of the general process area was 506 alpha dpm/100 cm^2. The average of all smears taken was only 60 dpm/100 cm^2.

5. Liquid Effluent Monitoring

Records of surveys conducted on liquid wastes, which are marked prior to release to the septic system, were reviewed. Records of samples taken in the sump ranged from 1.5×10^{-9} to 4.8×10^{-7} uc/ml. The survey area is located within the restricted area and is fenced-off by an 8' high cyclone fence.

6. Records

Records of personnel monitoring were noted to be maintained only for the last quarter ending December 31, 1960. No other reviewable records were available. The reason for this is discussed under D, "Personnel Monitoring." Direct radiation and airborne contamination records are maintained as well as records of waste disposal. Records of stack air samples and general air and breathing zone samples are also maintained. However, it was noted that in several instances, both stack air and general air samples were recorded in dpm per cubic meter and not in uc/ml. As noted prior in this report, Grieb, at the time of the inspection, was converting the dpm readings to uc/ml readings.

19. Posting and Labeling

Under License SNM-82, all entrances to the commercial plant were posted with a "Caution - Radioactive Materials" sign and symbol. The incoming vault is locked and posted with a "Caution - Radioactive Materials" sign and symbol. The key to this vault is only available to accountability personnel. The materials stored in the incoming vault were found to be labeled with the proper sign. However, special nuclear material was found to be labeled with the proper sign and identified by a process number, but was not labeled as to the amount of material. Examples of material which was not labeled as to the amount were several wrapped finished plates, each containing from 7 - 15 grams of U-235, and incoming raw materials and final scrap containing in excess of 100 grams of enriched uranium. Several containers containing samples of enriched uranium did not show the amount of enrichment or the weight. The inside container of these sample containers had a notation as to the weight uranium, but did not have any notation as to the enrichment. In the plant area, it was noted that fuel elements which contained 20% enriched uranium and which were stored in four coffins, each coffin containing six elements (175 grams per element), were not labeled as to amount or type of material. The element numbers were noted on the coffin, but not a radiation caution sign or symbol. The same was true for a container containing two elements which were fabricated for the University of Maryland.

With respect to the conditions noted above, Boll, Accountability Manager, through the records maintained in the Accountability Office, was able to identify each item noted above by the process number or the element numbers.

Under License SNM-141, the areas in which waste material or scrap were stored at Bayside were noted to be properly posted with the "Caution - Radiation Area" sign and symbol. All containers and pieces were noted to be properly labeled.

Form AEC-3, "Notice to Employees", was noted to be posted at the entrance to the restricted areas both at the Bayside and Hicksville plants.

20. Safety, Fire Protection and Security

General safety instructions and lectures have been given to employees both at Hicksville and Bayside. The written instructions available are concerned with the handling of pyrophoric materials, burning hood operations, hazards of thermal burns and fire and/or explosion, safe handling of toxic materials, packaging of pyrophoric materials, the hazards from radioactive materials and contamination, and the handling of incoming and outgoing radioactive shipments. A copy of the safety instructions is included in the licensee's file.

Fire drills were reported by Grieb to be carried out at least twice a year. Fire-fighting wardens and teams have been organized from the various employees both at Hicksville and Bayside. These groups have been lectured and instructed by Grieb.

A security guard force is in existence both at Bayside and Hicksville. Both facilities are enclosed by an 8' steel cyclone fence and are patrolled by guard force personnel 24 hours a day.

PART 40 INSPECTION

SYLCOR DIVISION
Sylvania Electric Products, Inc.
Hicksville, Long Island, New York
Bayside, Long Island, New York

Dates of Inspection: March 13, 14, 1961 (Announced)

Persons Accompanying Inspectors:

None.

Persons Contacted:

W. J. Donahue, Accountability Representative, Bayside

DETAILS

No operations involving material obtained under License C-3700 were in progress either at Bayside or Hicksville. There are only 15 Sylcor people employed at Bayside at present. Donahue, Accountability Representative, Bayside, stated that two of the 15 people had been periodically working with the reduction of uranium tetrafluoride and uranium hexafluoride for Union Carbide. He also added that during the performance of the above operations, 50 to 100 gram charges are employed, but that no work had been done for some time. Inspection and observation of the areas of use on the second floor of the Bayside facility showed that no work involving radioactive materials was in progress. At Hicksville, it was also found that little or no operations involving depleted or natural uranium were in progress at the time of the inspection.

The health and safety operations, accountability, security, etc. are the same as noted under the Part 70 inspection.

Several containers containing depleted uranium in the form of skull and dross from melting operations, although noted to be labeled with the proper radiation sign and symbol, did not have any notation as to the amount or type of material. Each of these containers contained at least 5 pounds of uranium.

SYLCOR DIVISION
Sylvania Electric Products, Inc.
March 15, 1961

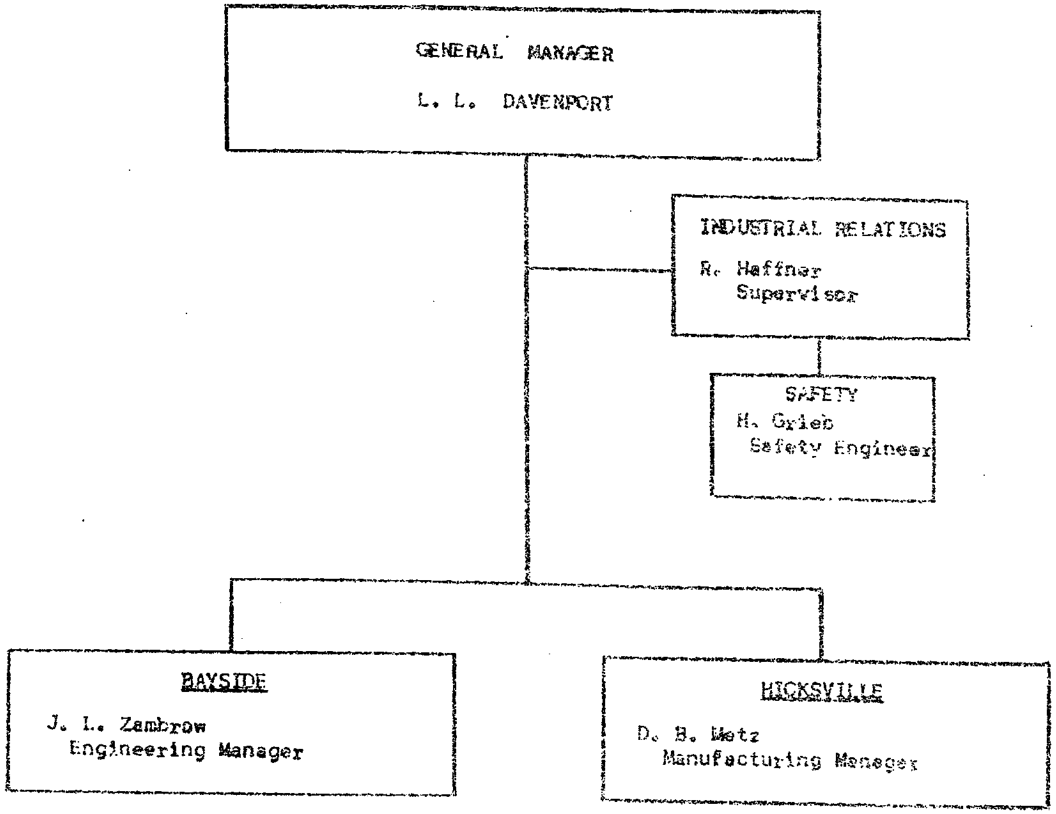


Exhibit "A"

1 cy - D L & R
2 cys - Cmp Div, NYOO

Approved by: Robert W. Kirkman, Director
New York
(Operations office)

May 1, 1961

If additional space is required for any numbered item, provide continuation pages in the same format, leaving sufficient margin for binding, identifying each continuation by number under appropriate item.

RECOMMENDATIONS SHOULD BE SET FORTH IN A SEPARATE COVERING MEMORANDUM

SYLCOR DIVISION
Sylvania Electric Products, Inc.
March 15, 1961

Bayside

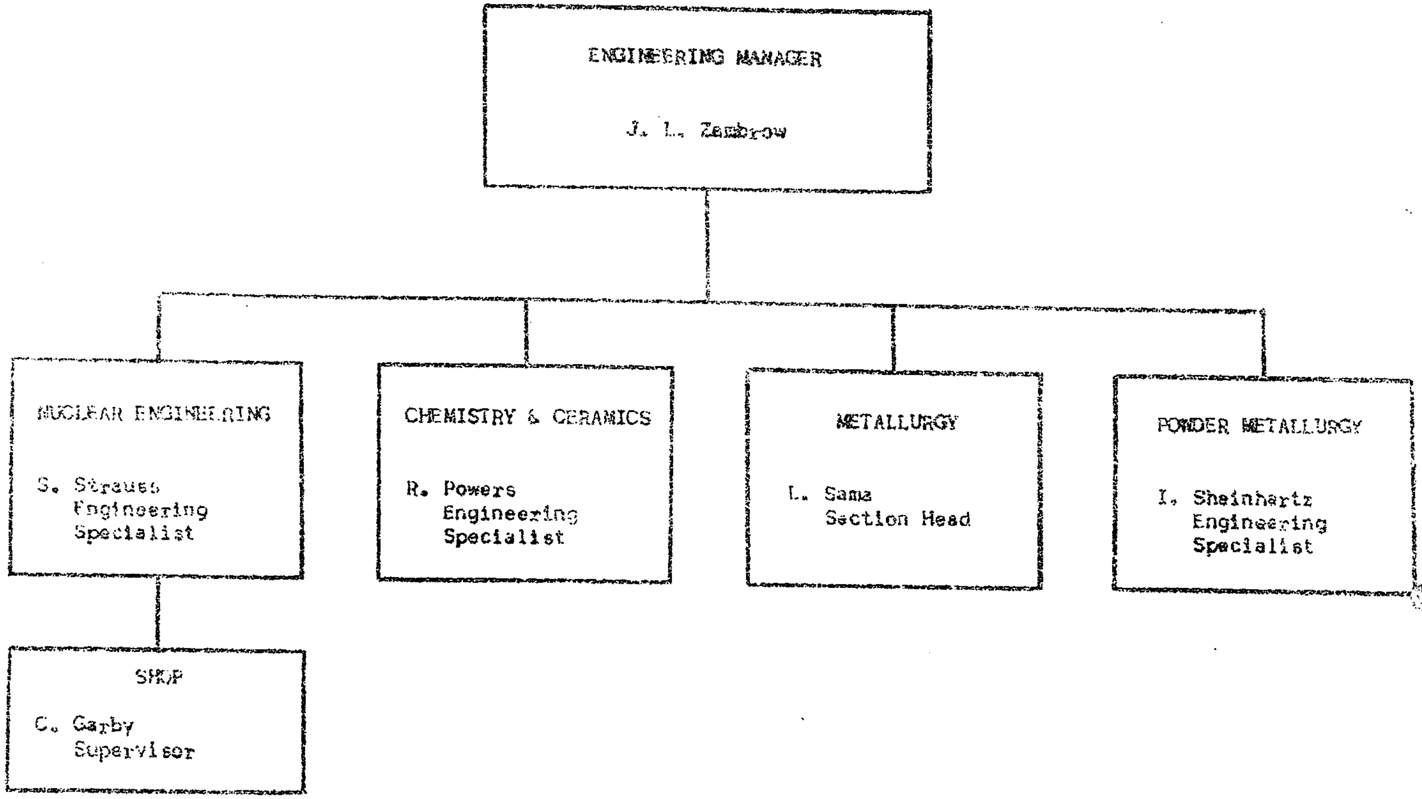


EXHIBIT "B"

2 cys - Cmp Div, NYOO

(Inspector)

Approved by: Robert W. Kirkman, Director
New York
(Operations office)

SYLCOR DIVISION
Sylvania Electric Products, Inc.
March 15, 1961

Hicksville

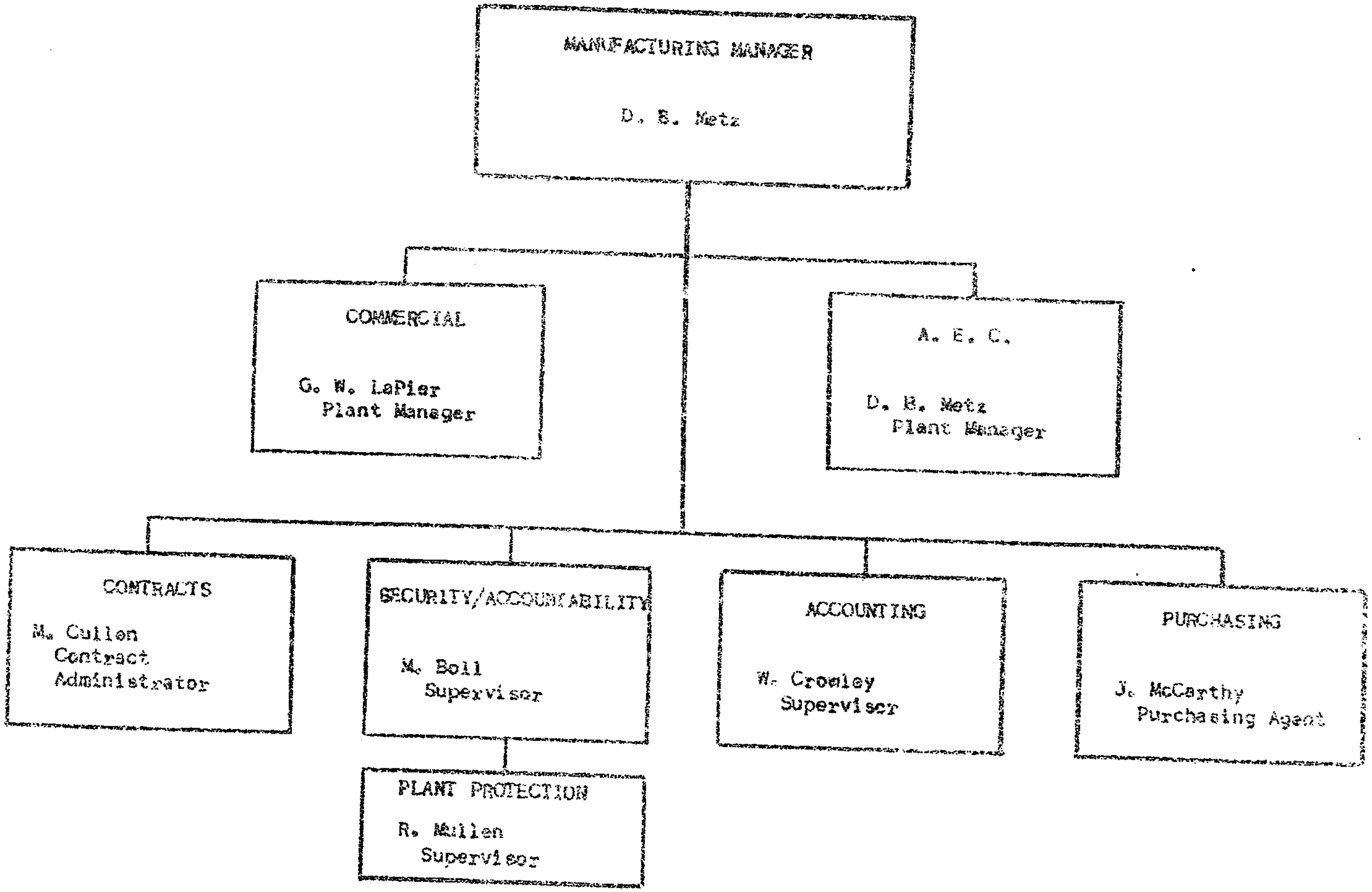


Exhibit C

1 cy - D L & R
2 cys - Cmp Div. NYOO

Approved by: Robert W. Kirkman, Director
New York
(Operations office)

May 2, 1961
(Date report prepared)

ACEKC00000680

AEC File

E-25-58

Dr. Morris Kleinfeld, Director
Division of Industrial Hygiene
Att: Dr. Robert Katz

Div. of Ind. Hyg.
New York City

Mr. Jack Beliff, Chief, Engineering Section

June 11, 1959

Sylvania Corning Nuclear Corp.
Cantiague Road
Hicksville, New York

Date visited:	February 27, 1959 April 21, 1959
Visited by:	Mr. Irving Kingsdey, Ind. Hyg. Engineer Mr. W. Harris, Chief, Industrial Hygiene and Radiation Section, U.S.A.E.C., N.Y. Operations office.
Persons interviewed:	Mr. Henry Grieb, Radiation Safety Supv. Mr. R. Andree, " " office
Purpose of visit:	Survey plant for compliance with rules of Code Bulletin No. 38
Origin:	Request from Medical Section

In accordance with a request from the Medical Section, the above plant was visited to determine whether it was in compliance with the rules of Code Bulletin No. 38. The long time period between the time of request and visit was due to difficulties in obtaining security clearance and coordinating the activities of the various personnel involved to arrange a mutually satisfactory time of visit as well as to illness, vacation schedules and shutdown of the plant for several months. The actual plant survey was made during the first visit. The second visit was made for the purpose of examining the company's air sampling and film badge records.

REPORT

There are two separate reactor fuel element manufacturing facilities at this location. The commercial plant makes many different kinds of fuel elements for different reactors. Natural, enriched, and depleted uranium are handled. About 250 people are employed on these operations on a three-shift, 7-day basis.

A separate building is used to prepare fuel for an Atomic Energy Commission plant using raw natural uranium. These operations have been reduced to some extent recently and there are about 130 people employed here on a 1-shift, 5-day per week basis.

Description of Operations

Commercial Plant

The sequence of operations is as follows: The uranium-aluminum

SYL00051120

ACEKC00004889

materials to be alloyed are weighed out in the accountability area and toted to the furnace room where they are melted at 960°E in a vacuum furnace exhausted by lateral hoods at top and bottom. The molds are poured in place beneath the furnace and the ingots removed from the molds in a ventilated hood located adjacent to the furnace. The ingots are heated, rolled in a mill exhausted by a canopy hood and sheared. Plugs are then punched out of the sheared pieces. These cores are placed in spaces which have been provided in aluminum plates called picture frames. There are two cores per plate. The plates are then hot-rolled to reduce their width by 50% and increase their length by 200%. They are sheared in half, faced on both sides with aluminum plate, tack welded on the sides and hot-rolled to a predetermined thickness. Then fluoroscopy is performed to determine the core length and its position. After another cold rolling operation, the plates are fluoroscoped again so that they can be centerpunched for the last shearing process. Finally, the plates are assembled into the elements and are inspected.

All these operations are performed in several rooms in either buildings #2 or #9. About 4 to 5 melts are prepared every 24 hours. The maximum weight percent of uranium in the alloy is about 40%. The average is about 8% to 12%. Due to criticality considerations, no more than two kilograms of U-235 (enriched) would be melted at one time and two ingots could be made from this. The maximum weight of any alloyed batch would be about 80 lbs.

Powdered compacts are also made in the same building containing the vacuum furnace (building #2). Mixtures of uranium oxide and stainless steel powders are weighed, blended and pressed. Weighing and pressing are done in ventilated dry boxes. The compacts are put in a bag for transport, sintered in an exhausted furnace, stamped and fitted into plates. Stainless steel plates are placed on either side and welded around the edges. The sandwich is heated in a hydrogen atmosphere furnace, rolled, sheared and then handled in a manner similar to that previously described. These operations are also performed in buildings #2 and #9. The production welding in building #9 involves the heliarc process and is unventilated.

A.E.C. Plant

This is building #1 and involves the pressure bonding of uranium in aluminum cans. Due to security reasons, a detailed description of the operations will not be given. Included, however, are nitric acid and caustic cleaning, nickel plating, molybdenum sulfide spraying, heat and pressure bonding, aluminum trimming and wire brushing and cleaning of die parts.

Building #21

Production machining is done here. Lathes, grinders, cut-off wheels, etc. are provided for operations on normal bare uranium. The machinery is run wet.

Burning Building #3

This is a separate building used to burn scrap, uranium pellets and contaminated waste. Burning is done in trays set in enclosed transite hoods provided with slots in the front for raking the material. The burned residue is subsequently dumped from the trays into drums resting on the floor of the enclosure. Burning is now done about once a week.

Ventilation and Measurements

Commercial Plant

Building #2

The powdered compact dry boxes, vacuum furnace and ingot hood are exhausted in one system. A filter box located on the roof and containing AAF Deep Bed Filters is used as the dust collector. Velocities of 200 fpm were found in the openings of the hood containing the press and 300 to 400 fpm through the air lock opening in the weigh hood. Compacts were not being made at this time. The vacuum furnace was also not in operation as changes in its construction and ventilation were in progress. About 400 fpm was measured at the edge of the canopy hood over the rolling mill.

Building #9

The sintering furnace exhaust system also includes an AAF Deep Bed Filter unit as a dust collector.

Other exhaust systems are provided for several additional operations not previously mentioned which are performed during the forming and finishing of the elements. These are as follows:

1. Spraying a sodium silicate bonding material. This is done in a booth on a table. The average velocity through the opening was about 75 fpm. The space from the floor to the table top was open, short circuiting air. Baffles were not provided.

2. Degreasing - This is done in an electrically heated perchlorethylene vapor degreaser measuring 38" x 48" and having a freeboard of 17". Cooling coils are provided, as is one thermostat at the level of the coils. A hoist is provided but hand operation is practised. Standard

ventilation by lateral slots on the two long sides is provided. The ventilation rate was about 20 cfm per sq. ft.

3. Cleaning in hot water, alkali, acid. There are 8 small tanks on a stand in an enclosing hood having an average face velocity of 50 fpm.

4. Removal of heat from an electrically heated aluminum brazing furnace in the assembly room. The canopy hood provided at this oven was ventilated to maintain an inward velocity at its edge of 100 to 150 fpm.

5. An electrostatic precipitator collection system is provided for a centerless grinder, lathe, cut-off machine and rod straightener in the north east corner of the room.

In addition there are 2 hoods in the laboratory where accountability control analyses, scrap reprocessing, ingot sample testing, etc. are performed. Face velocities of 25 to 50 fpm were found.

A.E.C. Plant

1. Two booths are provided for the spraying of a water-base solution of molybdenum disulfide. Average velocity through the booths was 75 to 100 fpm.

2. Aluminum trimming and wire brush cleaning of the dies are exhausted in one system. Velocities of 150 to 400 fpm were measured in the hood openings. These operations do not give rise to uranium dust. A general air inlet from an office and an exhaust line from a vacuum pump are also included in this system. A dust collector is not provided. Rectangular piping is used, and the branch pipe from the die cleaning machine enters directly into the main pipe at its end.

3. Cleaning tanks are exhausted by rear slots with tapered connections and 50 to 100 fpm was measured at the tank edge.

Building #21

Two exhaust systems including filter boxes with AAF Deep Bed Filters are provided for the production machines. Some machines have enclosing hoods and some are exhausted by open end pipes. None of these machines were in operation and tests were not made.

Burning Building

About 300 to 400 fpm was measured in the hood slots.

Two deep mat filter units are provided for collecting the dust released during this operation. These filter boxes and the others are equipped with manometers to measure the pressure drop across the units. The fans are on the clean sides of the filters. The units are inspected and filters changed monthly, being sprayed with varnish for dust suppression before removal. The used filters are drummed and shipped for disposal.

Air Tests

Air tests were taken at those operations in progress at the time of the visit. All results indicated concentrations comparable to the normal background. The locations were as follows:

1. Rolling mill in building #2 - breathing zone - hot rolling clad, sheared plates containing 18% U.235.

2. Rolling mill in building #2 - breathing zone - hot rolling clad, sheared plates containing 18% U.235.

3. In accountability vault - bldg. #9 - general air.

4. Rolling mill in building #9 - breathing zone - hot rolling clad, powdered cores

5. Rolling mill in building #9 - breathing zone - hot rolling clad, powdered cores

6. Shearing two plates building #9 - breathing zone - plates contain 2 gms. of uranium

7. Storage room building #1 - general air

The company has extensive records of air samples taken throughout the plants, dating back many years. All new operations are surveyed and a complete air sample survey is made at least every six months. Of the samples taken this year, results exceeding the maximum permissible level of about 100 disintegrations per minute per cubic meter of air, were found while weighing and compacting uranium oxide powder and at a turning machine used to cut rods to size. In the first case, the company claims to have eliminated the problem by redesigning the hoods, and in the second instance indicated that the amount of time actually spent at the operation was too small to classify it as hazardous. The velocities obtained at the powder weighing and compacting hoods should be adequate to control the hazard.

Individual time weighted average calculations are not made because the company feels it is unnecessary.

Outdoor monitoring is done. Thus far the results have indicated concentrations low enough not to be considered a problem.

External Radiation

Radiation measurements were made with a Juno meter in buildings #1, #2 and #9. The highest reading recorded was 50 mr/hr above a box of normal uranium blanks in the storage room of the A.E.C. building. This is mostly beta radiation and the intensity falls off so that a measurement about 3 feet above the box indicated a rate of 4 mr/hr.

Employees who may be in contact with uranium wear film badges which are checked weekly. This year's records indicate that in only one week for one person did the combined beta, gamma readings exceed 300 mrem. In this case the total was 325 mrem (285 mr beta). This man works in the plating area of the A.E.C. plant where close contact with the material is necessary.

Weekly radiation surveys are conducted by the plant's health and safety officer, including the taking of swipe samples. Decontamination methods are recommended as needed.

Accountability & Criticality

Commercial Plant - Buildings #2 and #9

Due to the expense of the materials and the fact that an accidental chain reaction may occur with uranium under certain conditions of enrichment, concentration, density, quantity, geometry, etc. extreme care is exercised in the handling, storage and processing of the materials and elements. One man per shift is in charge of the accountability vault in building #9. This involves checking the weight of incoming materials, the batch products, ingots and melt products. Extreme caution is exercised to insure that critical masses of material are not brought into the same processing area. Processed material in various stages of completion is also stored in racks separated so as to prevent interaction of fissionable materials. Raw material is kept in bird cages which insure that fissionable material can never be closer than about 2 feet from the next storage package.

Only non-critical quantities of finished material are allowed in the inspection room. About 10 stations having yellow lines painted on the floor outlining their boundaries are provided. Material cannot be moved beyond these confines.

A.E.C. Plant

There is no criticality problem here because the quantity of natural uranium needed to start and sustain a chain reaction greatly exceeds the amounts of uranium in the plant.

Medical

A physician is in the plant twice a day. Pre-employment examinations are given and routine physical examinations are conducted every 12 to 18 months. Urine samples are taken at new job locations, when a fire occurs, or when an air sample indicates high results.

Personal Hygiene

The company supplies the workers with pants, gloves, shirts, lab coats and plastic aprons at least twice a week. Shoe coverings are required for entry into some areas. Laundry iso handled twice a week by a commercial laundry out of state. Lockers and showers are provided although there are no one way exits. Respirators are not required for any operations presently performed. There are gas masks, dust respirators, and air supplied respirators on hand for emergencies.

Pyrophoricity

Chips, trimmings, etc. from machining operations are allowed to accumulate in the building to the extent of filling 3/4 of a 5 gallon can. Thereafter they are stored in covered 30 gallon cans outside the building before being burned in the burning building. No quantity of scrap can be stored in the building overnight. The material is stored as it is formed in the operation, coated with coolant. The company reports no uranium fires in the past two-years. Ansul dry powder and G-1 powder are used in the machining area as a fire extinguisher. CO_2, soda-acid, foam and water are also available.

Porter service is provided. Mostly wet swabbing is done and very seldom is vacumming performed. Sweeping is not used. Adequate labeling of equipment, areas, etc. with radiation signs was noted.

Discussion

A.E.C. Plant

The dust hazard associated with this plant appears to be minimal because the raw uranium is plated almost immediately at the start of the operation and before that is handled as a massive cold piece.

Although the exhaust system for the aluminum trimming and die wire brushing operations is improperly designed, there does not appear to be any hazard associated with these operations so that the existing installation will probably be satisfactory.

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Commercial Plant

This plant is essentially a job and development shop, processing many different types of articles. All manufacturing operations are not in progress every day. The criticality problem also limits the extent of the operations. It would thus be extremely difficult and time-consuming to make a complete survey at these premises. Furthermore, the nature and location of the operations appear to be in a constant state of flux, also hindering a proper health evaluation. Therefore, since they appear to have been obtained properly, it is felt that the company's air sampling records can be used as an indication of conditions. Although these records show, in general, favorable results, many readings are not strictly applicable in determining the present situation since they are old and were taken at different locations and under different conditions than exist today. However, although recent air samples at all the potentially hazardous operations had not been taken at this time, it is likely that where local ventilation is provided the present control is as good as, if not better than, that previously recorded. This applies as well to other areas besides the commercial building. In addition, observations and the limited air tests made indicate that many operations do not release uranium dust to the air because they are performed after the metal has been clad.

There are certain uncontrolled operations, however, such as weighing in the accountability area (2 yr. old records indicate extremely high dust concentrations while weighing U-235 pellets), hot rolling of unclad material in building #9 and the shearing and punching of unclad material which tend to give rise to airborne contamination. Although corroborative air tests could not be made, it would appear that on the basis of observations, reports in the literature, and knowledge of the operations excessive dust concentrations could be obtained. Despite the company's claim that these operations have been checked carefully to insure no loss of material and excessive airborne contamination, and although hot rolling is done with a lubricant to coat the uranium and prevent excessive oxidation, it is felt that, without ventilation, incidents may occur resulting in massive exposures to the workers.

The degreaser, sodium silicate bonding spray booth, and laboratory hoods in building #9 are not operating in accordance with good engineering practice or New York State Code Rule requirements.

The performance of welding, particularly heliarc welding in building #9 with its potential generation of excessive quantities of ozone may also tend to injure the workers' health.

General

The filter box dust collectors provided for many of the operations are not deemed too desirable. The workers may be exposed to excessive dust concentrations while changing filters, despite the spraying which is done, and excessive buildup of dust on the filters can cause reduced air flow at the hoods with subsequent worker exposure.

External Radiation

The external radiation hazard appears to be quite slight. For all practical purposes, this hazard is due primarily to beta particles. The alpha emissions will not penetrate the outer layer of skin and the amount of gamma radiation is negligible. The beta radiation is kept under control by the practice of having the employees handling the uranium wear leather palm gloves. Therefore, the film badge readings, which this year showed only one weekly exposure slightly in excess of 300 mr. may not be completely indicative of the actual personnel exposure because of the protection offered by the gloves and other clothing. A weekly permissible dose rate of 600 mrem may also be considered to be applicable in this instance since Code 38 permits this rate in the skin for employees whose entire body or major portion thereof is exposed to radiation from external sources.

CONCLUSIONS

The plants appear to be operating in substantial compliance with Code Bulletin No. 38 and in general to be providing proper facilities and trained personnel for the detection and control of contaminants and external radiation present in quantities which would tend to injure the workers' health. However, as a safety factor, to prevent any potential massive internal exposure to radioactive materials as well as to forestall any unsafe future condition caused by the operation of the more standard equipment, it is felt that additional control or modification of existing conditions as indicated below is necessary.

RECOMMENDATIONS

1. Local exhaust ventilation should be provided for

    a) weighing operations in the accountability section,
    b) hot rolling of unclad material in building #9, and
    c) shearing and punching operations on unclad materials.

2. The filter box dust collectors should be replaced by continuous cleaning cloth arrestors or other suitable types which can be cleaned externally and which have constant pressure drops so that uniform air flow at the hoods will be maintained. This type of collector should also be used in all future installations.

3. Local exhaust ventilation should be provided for production welding in building #9. Local hoods as indicated on engineering plate #166 exhausted to maintain at least 100 fpm at the arc can probably be used.

4. The degreaser ventilation rate should be increased to maintain at least 60 cfm per square foot of tank area.

    a) A thermostat should be provided in the liquid zone connected to control or shut off the source of heat when the contents reach a temperature not higher than 20°F in excess of the boiling point of the uncontaminated solvent.

    b) If not already regulated, the hoist speed should be set not to exceed 11 feet per minute.

5. The space between the floor and table top in the sodium silicate bonding hood should be covered and baffles provided in the hood.

6. The ventilation rate in the laboratory hoods should be increased to maintain at least 100 fpm through the open areas. If not already provided, adequate filters should be installed for cleaning the air before it is discharged to the out of doors.

7. Letter of recommendations to company.

Irving Kingsley
Sr. Industrial Hygiene Engineer

Jack Baliff, P.E.
Chief, Engineering Section

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Responsive Record 26

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WSRC DECLASSIFICATION REVIEW

1st Review Date: 4/26/04	Determination (Circle Number)
Authority: ☒ ADC ☐ ADD	1. Classification Unchanged
Name: RL Collins	2. Classification Changed To:
2nd Review Date: 4/28/04	
Authority: ADD	3. Classification Cancelled
Name:	4. Other: CG-NMP-2 9/00

AMENDMENT No. 1 TO APPENDIX "B",
DATED: DECEMBER 7, 1953,
TO CONTRACT No. AT(30-1)-1293
DATED DECEMBER 10, 1951.

SR 84

This Amendment No. 1 describes the scope of work under Contract No. AT(30-1)-1293 for the period July 1, 1953 through June 30, 1954. Said scope of work follows:

A. Produce the balance of 5,000 slugs for Hanford evaluation (about 1,000 slugs were produced for this purpose during fiscal year 1953).

✓ B. Demonstrate that the powder metallurgy process can be controlled by improving and sustaining the yield to over 95% with the existing facilities.

✓ C. Determine the amount and origin of nitrogen in each step of the process and investigate the means of maintaining nitrogen content of finished slugs within specifications.

✓ D. Accumulate, correlate and report data gained in performing work described in Items A, B and C to establish optimum conditions for producing powder metallurgy slugs with a high yield.

✓ E. On the basis of satisfactory performance of Items A to D, inclusive, at Hicksville and successful experimental work at Bayside, investigate the means and techniques necessary to produce other shapes by powder metallurgy process.

Accepted: W E Kingston

SYLVANIA ELECTRIC PRODUCTS, INC.

By: Date: January 13, 1954

Title: General Manager
Atomic Energy Division

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[redacted]

SROO Response to
FOIA (SR) - 04-028

ACEKC00006259